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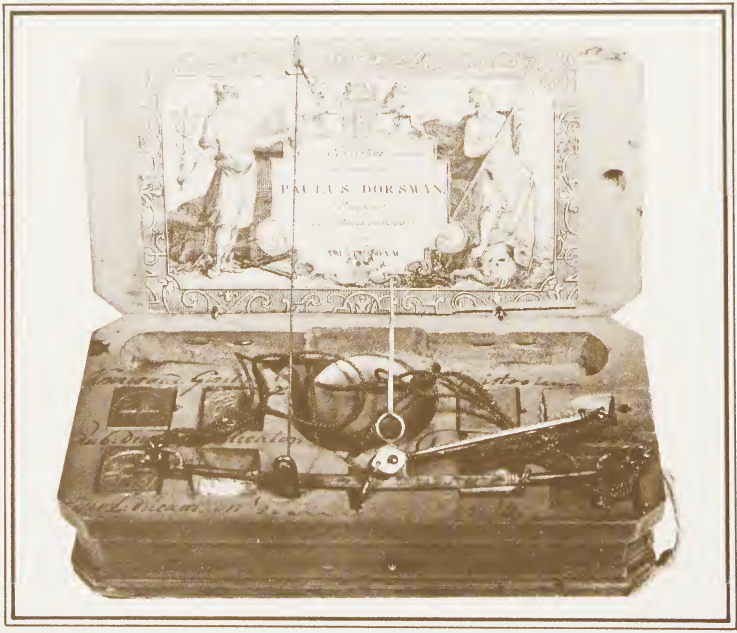

Editor's Comment

In this issue Hans Jenemann introduces a method of weighing which may be new to many people. Substitution weighing enables anyone to weigh with a high degree of accuracy, providing that accurate weights are used and that the balance is sensitive. Whenever you are weighing weights in your own collection to determine their accuracy or their denomination, it is advisable to use the substitution method, because most old balances of the past did not have EXACTLY equal arms. If you do a lot of weighing, or if you want particularly accurate results, do not rely on old weights from your collection - buy accurately adjusted new weights from a scale supplier.

Retired Weights and Measures inspector, Bob Holdaway, takes another fascinating look at commercial weighing years ago (see page 851). Other members who were involved in manufacture, inspection, repair, or any other aspect of weighing, are invited to write about their reminiscences for Equilibrium - don't let the knowledge of your profession be forgotten. (If writing English is not easy for you, don't worry, the Editor will smooth out any difficulties!)

Cover Picture

This fine money balance was made by Paulus Dorsman to weigh any of the gold coins passing through the international port of Amsterdam. An extra tray of weights slides under the scales and weights, held in by a little knobbed poker. The brightly coloured label shows Mercury, Neptune and the Arms of Amsterdam. (Dorsman born Rotterdam 1708; Master of the Mint and Sealer of Weights for Batavia 1745-51; Worked as assayer and scalemaker in the Kalverstraat op de hoek van het Weesplein, Amsterdam; Died 1764).

INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS
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President — Bob Stein
Vice Presidents — Michael A. Crawforth, Tod Carley

For membership information, write to address above.

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Editor — Michael A. Crawforth
Associate Editor — Diana Crawforth
2 Field Close, Yarnton
Oxford OX5 1NE England

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Another Look Back

BOB HOLDAWAY

Reprinted from The Saturday Evening Post © 1936.
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After some two years service in the Weights and Measures department of the Crewe Corporation, I was warned that I would be expected to accompany the Inspector on his outdoor visits in the near future. 'Warned' appeared to be a very ominous word, but as far as I was concerned, this was a very long-awaited pleasure, and I spent a hectic day or so under the tutelege of a senior assistant, learning how to enter the results of the inspector's tests along with any comment he might make, into the official columned notebook. I practised setting-up the beam scale and handing over the appropriate weights in the correct order, including, when necessary, the 'star' punch and a little hammer for applying cancellation marks. My teacher, with considerable foresight, also advised that keeping my eyes and ears open and my mouth closed was the order of the day.

At last the day came when I was to go out on inspection. A box of weights were in one hand and a boxed portable aluminium beam scale in the other, both being weightless in the euphoria of getting outside amongst the action! All went reasonably well and the last visits of the morning were looming up. We entered a small general store which was very dark, not very clean, and smelled of firelighters and vinegar. On announcing his presence, the wily inspector moved quickly to a small counter machine near the sweet jars, beating the shopkeeper who had been standing behind the counter, by a short head (or hand!). When the inspector took a 2 lb weight off the weight pan the goods pan went down with a bump. On turning the machine upside down, a sweet was found stuck to the bottom of the stay, unseen, of course, by any customer.

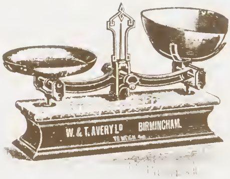

W. & T. AVERY LD BIRMINGHAM

FIG 1. Confectioner's small counter machine.

Indeed, I was later informed that some twenty years earlier, in 1913, the same inspector had, on inspection duties in Crewe Market, found a scale with a large piece of cheese tightly pressed into the back corner of the goods pan in such a manner that the customer could not see it. A half-pound weight was kept on the weight pan so that the effect of the cheese could not be seen. The cheese weighed one ounce. On this occasion, the stallholder was fined £3 and costs, which was about twice the value of the average weekly wage at that time.

Cheating the customer in this unsophisticated way was not very difficult, nor, for that matter, was detection. It was a question of the inspector being in the right place at the right time - no doubt as true today as it was then. Legislation regulated the pattern of weights, scales and weighing machines which were permitted for trade use, along with their accuracy and the manner in which they should be used. Research into weights and measures offences in those days shows a variety of ways in which a purchaser could be deceived, and the maxim 'caveat emptor' - let the buyer beware - was one which a customer ignored at his peril when in the company of such characters.

The shopkeeper was duly prosecuted for having in his possession, for use for trade, an unjust weighing machine. His excuse was that he was 'encouraging trade'. The magistrates decided that a fine of 10 shillings was adequate, as this was his first offence, and they told the defendant that he was a very lucky man. Magistrates often made ambiguous comments in those days, the classic being 'we find you not guilty, but don't do it again.'

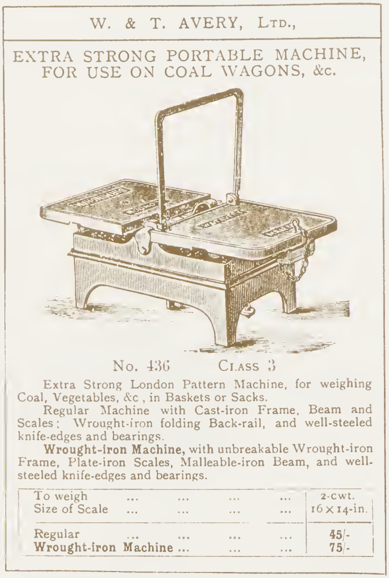
The advice to keep my eyes open and alert was soon learned, as was the suggestion that a weight resting in the pan between periods of use may mean more than just preventing the beam from swinging.

A stallholder at Hanley market who was selling strawberries, discovered a double way of making an illegal profit. Not being content with leaving a large strawberry loose in the goods pan, he also tilted the counter scale at an angle of thirty degrees. With the goods pan uppermost this made the machine a further fourteen drams (7/8 oz) out of balance. As usual in these circumstances, a weight was left on the weight pan. Upon conviction, a fine of £1, plus costs, was imposed.

This practice of placing a counter machine on an incline is not unknown today, amongst certain 'barrow boys'. Often the barrow itself is tilted, and if the street is on a hill, so much the better from their point of view.

It was not only the 'little man' who could find himself in trouble, as was evident from a case heard at Loughborough Court, when the Shepshed Urban District Council were summoned for having an unjust weighing machine. The clerk of the council said the machine was not used for trade purposes. But the inspector said that the machine, which was situated in a quarry, was half-a-hundredweight out in a ton. Evidence was given that each year, 1500 tons of stone went over the machine and the men who broke the stones were "paid a certain price per ton". The magistrates termed it a case of the grossest neglect and they considered that something ought to be given to the men who had lost money due to the incorrectness of the machine. The Council were fined £5, which ratepayers in the district probably considered a little hard.

Similarly, passengers on the Cambridge line might wonder how much of their fares contributed to the fine of £2 which the Court imposed on the London and North Eastern Railway Company for having an unjust weighing machine at Cambridge station. The inspector gave evidence that he saw two porters



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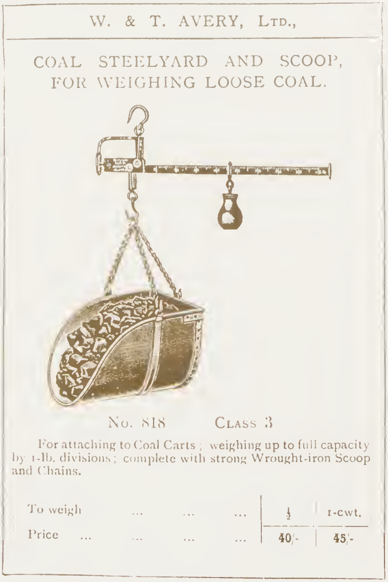
To weigh	2-cwt.
Size of Scale	16 × 14-in.
Regular	45/-
Wrought-iron Machine	75/-

FIG 2. A deadweight machine.



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To weigh	½	1-cwt.
Price	40/-	45/-

FIG 3. Steelyard for coal carts.

weighing parcels on a spring balance. The pointer did not return to zero and was three and a half pounds 'fast' when there was nothing on the platform (the scale platform, presumably). The defence that the weighing machine was not used for trade was not accepted by the magistrates.

Regarding weights, regulations specifying the denomination, shape and the material were intended to counteract the confusion that existed, and which was often exploited, but of course, when weighings were made out of sight of the customer then cheating could still occur. At Liverpool, a greengrocer was fined £3, plus costs, on each of three charges of wilfully committing a fraud in the use of certain weights, 2 lb, 1 lb, and ½ lb (i.e. a total of 3½ lb). Evidence was given of an advertisement which stated "Potatoes - 4 lbs for 1½d" Three test purchases were made and all were found to be less than the advertised 4 lbs. No other weights were on the greengrocer's premises. It is a sobering thought that those fines would total around £800 in today's money.

Local bye-laws, regulating the sale of coal in small quantities, required the local authority to specify the type of scale to be carried with any vehicle in which coal was carried for sale or delivery to a purchaser. In the North East of England, for some reason, beam scales were often favoured by the authorities as being suitable for the purpose. The following two selected reports show just how wrong the authorities were:

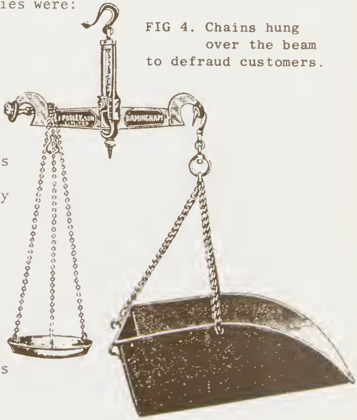


FIG 4. Chains hung over the beam to defraud customers.

Four coal hawkers (sellers) in Newcastle upon Tyne were summoned in 1912 for causing their scales to be unjust by twisting the hook over the beam. Fines of twenty shillings were imposed, and the scales were ordered to be forfeited. At neighbouring Gateshead, fourteen years later, a coal hawker was charged with manipulating his scale to make it largely against the purchaser. The inspector, in giving evidence, said that he saw the defendant selling coal and noticed that he had the hook on the weight pan of the scale twisted, causing the scale to be 5 lbs unjust against the purchaser in 14 lbs of goods, and 8 lbs in 28 lbs of goods. The coal merchant was fined £5 after the chief inspector had said that it was the worst case he had known in his thirty-two years of experience.

The selling of coal in small quantities was particularly prevalent in that area up to 1939, and so was this type of mean fraud. One cannot fail to wonder why chief inspectors, in their role as advisors to their local authorities, did not outlaw beam scales for use in selling coal. Some of their later difficulties in detecting twisted-hook frauds could be said to be very much of their own making.

Another type of unsuitable scale carried on vehicles used by coal merchants in other authorities' areas in the North East, was the steelyard which could also be manipulated to the disadvantage of the purchaser. The scale that best met the requirements of the law was generally considered to be the 'deadweight machine', Fig 2, together with the appropriate weights, and most local authorities in the United Kingdom specified this pattern of machine in their bye-laws.

It ought to be emphasised that traders engaged in perpetrating the frauds described above were very much in a minority. The question is, was all this chicanery really necessary ? In the absence of any official price structure, or of any link between prices and unit weight, goods can be sold at whatever price the competition, or the lack of it, will stand. Of course, seventy years ago, when prices were extremely low, there was not the scope for price variation that exists today. It would appear that the trickster of those days thought that one way to encourage trade was to let the customer see the goods pan go down with a bump - what a generous man! - which brings me full circle back to my first experience of deliberate cheating. Was it really fifty-two years ago ?

The above prosecutions, with the exception of the one at Crewe in which I was a very silent witness, and the one at Gateshead, took place between the years 1912 and 1914 and are condensed from reports published in The Monthly Review, Journal of the Weights and Measures, now the Trading Standards, Administration.

Showcase

Photographs sent in
by AIMÉ POMMIER

This special edition of SHOWCASE features rare weights from the collection of the Musée National des Techniques in Paris.

Figs 1 & 2: Two knobbed weights marked "P 1 AB" and the other "P 1 TR", being 1 Pound Avoirdupois and 1 Pound Troy, respectively. The underside of the Avoir weight is shown in Fig 3, crowned G for the monarch, the dagger of the City of London, A for avoirdupois, and the ewer of Founder's Company (the Guild which controlled the activities of foundrymen). The arrangement of the marks suggests a date from the latter half of George III's reign.

Fig 4: Weights marked 2/3 oz and 1/3 oz, which were probably standards presented to France by the British Government at the time of the special postal arrangements between Britain and France, from 1869 to 1875. These weight values were approximately equal to 20 grams and 10 grams, for letters going to France.

Fig 5a & 5b: A knobbed brass weight marked on one side "One Pound Troy" and on the other side "DeGrave & Son, London". Mary DeGrave & Son were in business from 1817 to 1844, Mary being the widow of the famous Charles DeGrave who worked 1782 - d.1799.

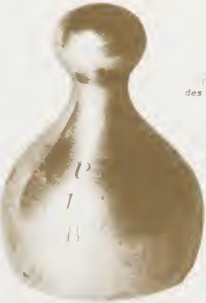


FIG 1.

Coll. et cl. Musée National
des Techniques - C.N.A.M., Paris.

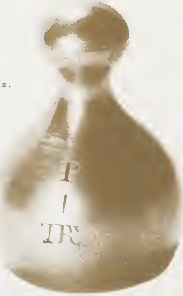


FIG 2.

SHOWCASE

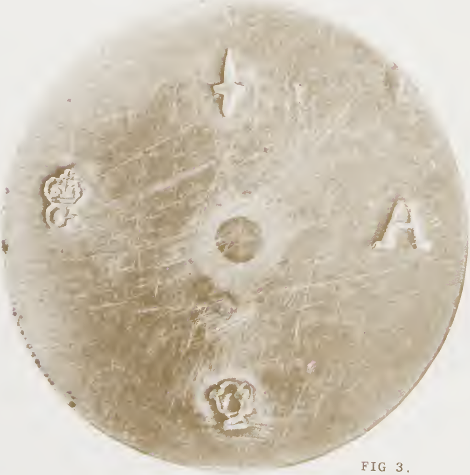
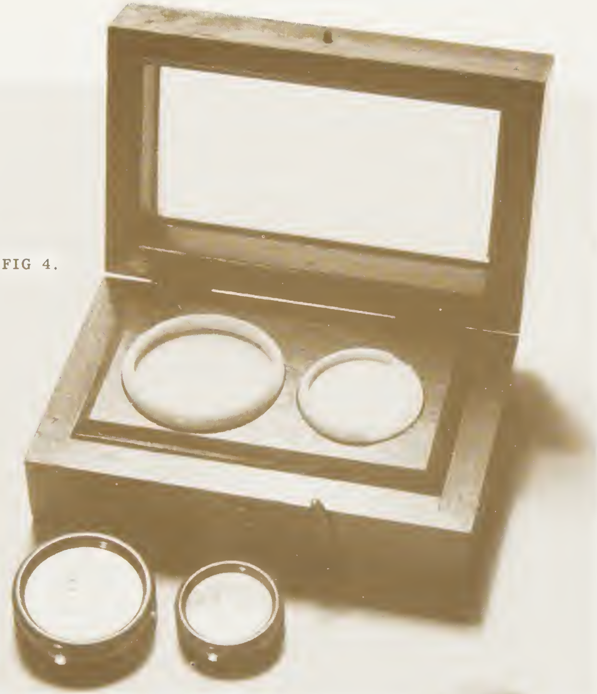


FIG 3.

FIG 4.



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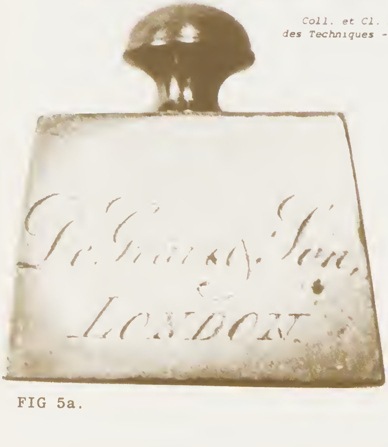


FIG 5a.

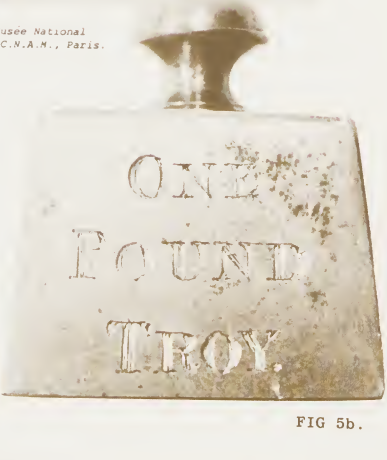


FIG 5b.

Old Iron Beams

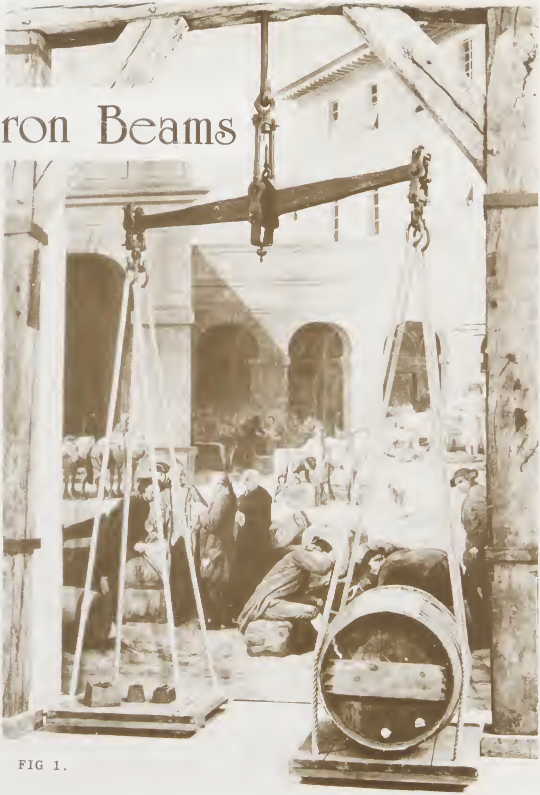


FIG 1.

1: THE GREAT BEAM OF BORDEAUX

AIMÉ POMMIER

The Customs Museum at Bordeaux has preserved a splendid equal-arm balance, with double hooks and of a large capacity, which was not used for commerce. It could, however, be an example of the design which was used for commerce from the 17th to the 19th centuries.

The beam is engraved with the date 1783, so it has survived for two centuries. It is probable that the beam was made to the order of the 'Fermiers généraux' - the revenue collectors- but it is certain that it was bought directly from the maker, in 1783, by the collectors, for exclusive use in the old Customs House. Since that time, the beam has remained in the House which has now become the Customs Museum.

The beam is in perfect condition. With imposing dimensions, it is without doubt, one of the largest of its type and age that has been preserved. It is a great pleasure that circumstances have permitted the survival of such a valuable object for the history of metrology and for the Customs Service.

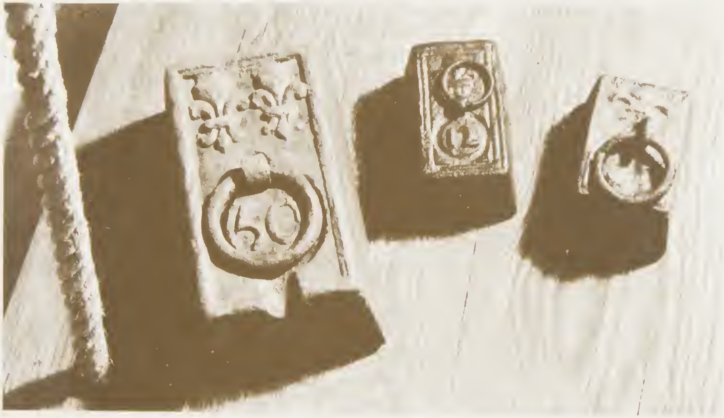


FIG 2. Weights accompanying the great beam of Bordeaux; 50 & 12 Livres.

I was given the opportunity, by the authorities, to examine the beam closely, perched on the top of a ladder, to measure its dimensions. I confess I was excited by touching the beam and contemplating this magnificent work of forged iron, so harmoniously worked - by its proportions, by the sheer mass of metal from which it was made, by the ease with which it still responds to a load, it evoked a powerful tranquility, sure and faithful ....

Also, one thinks about how it was made; an instrument of this weight and of this shape, forged, assembled, adjusted with precision, is a testimony to the astonishing skill of the scalemakers of that epoch. ▷

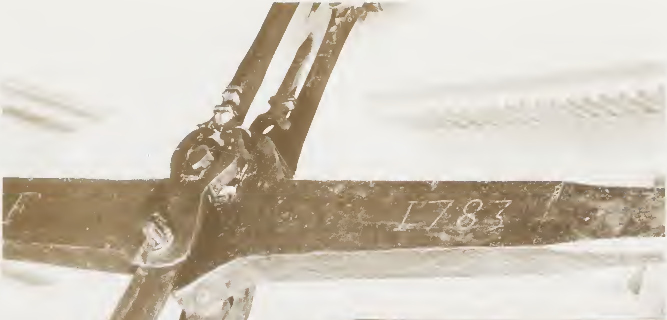


FIG 3. Details of the shears foot and pendant. Part of the initials AF and the date 1783 can be seen on the side of the beam.

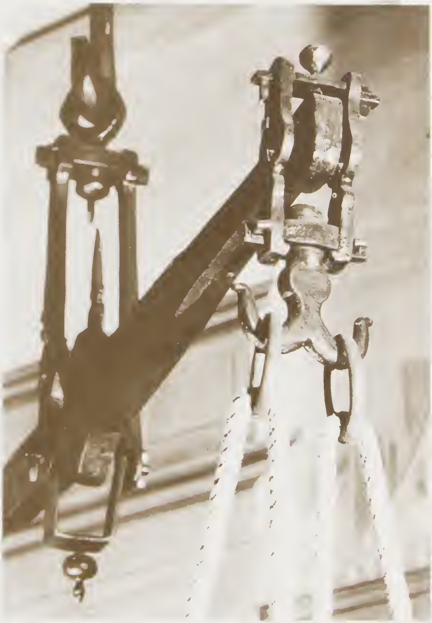


FIG 4. Details of the 'Dutch' beam end. The 'cheeks', or side plates, are held by flat split-pins, developed from the wedges used in old wooden structures.

FIG 1.(p.858). The scene shown behind the great beam is a copy of *L'intérieur d'une douane*, painted in 1775 by Bernard Lépicié (collection Thyssen-Bornemisza à Lugano).

When the beam was found it had no pans or plates to suspend the weights or hold the load.... In order to display a completely restored balance in the museum, it was necessary to determine the nature of the missing parts - plates of iron or wood?... were the plates suspended by chains or ropes? The final choice was helped by surviving evidence:-

1. A famous bas-relief from the end of the 15th century, preserved in the Nuremberg Museum, which shows a large balance with chains and iron plates. However, this equipment appears to have been used in Germanic countries, and seems to have been abandoned by the end of the 16th century.
2. A 15th century stained-glass window in the cathedral of Tournai, Fig 5, which shows the public scales of the town, comprising a large beam with wooden plates suspended by ropes.

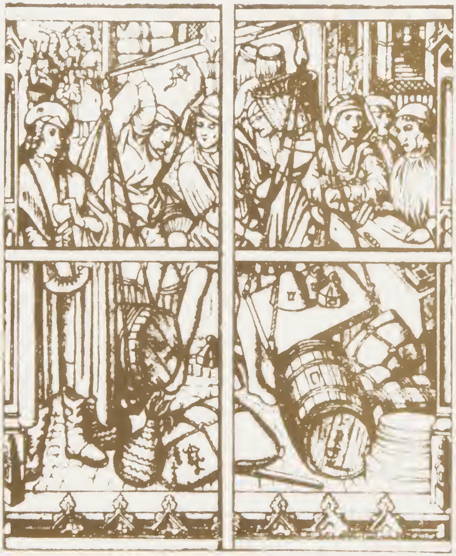


FIG 5. Stained glass window in the cathedral of Tournai. Note the shape of the weights on the scale.

3. A 17th century document reporting that the 'public scale' for the town of Tonneins, about 100 km from Bordeaux, used:- "...plates of wood (walnut) suspended by ropes from an ...iron beam ... and twelve lead quintal weights with iron rings; ten full quintals, and two quintals in half-quarters and other small weights."
4. A balance found recently (1980) in a farm to the south of Beauce, Fig 6. With a length of 1.15 M (43.3"), this beam may be classed, perhaps, among the 'great beams' of commerce. The provenance of this beam is analagous to that of the beam from Bordeaux, which has a length of 2 M (6' 6.75"). It has a very similar date, 1788, as well as the initials of the same maker. There are, therefore, very big similarities between the two instruments. ⊳

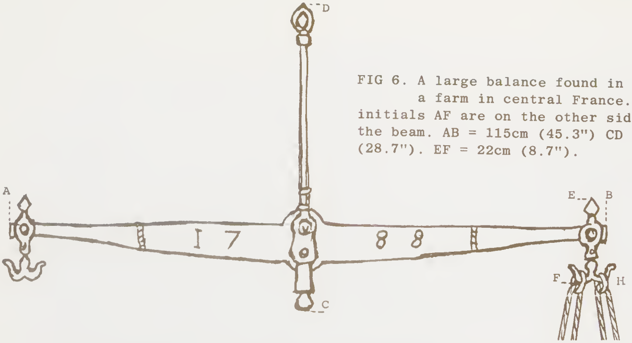
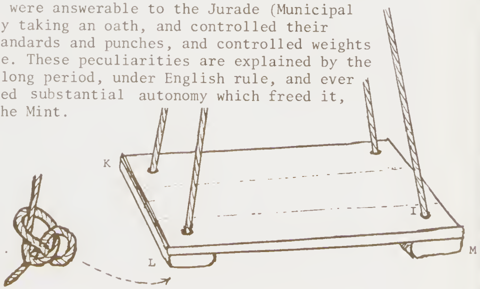


FIG 6. A large balance found in 1980 on a farm in central France. The initials AF are on the other side of the beam. AB = 115cm (45.3") CD = 73cm (28.7"). EF = 22cm (8.7").

When it was discovered, the balance from Beauce was complete, with its plates made from planks of wood, and its ropes and suspension rings. Obviously, one should ask if these accessories are original, or more recent additions? However, according to the evidence gathered, the balance was left, forgotten, in a loft well before the Great war (1914). Also, the appearance of the ropes and plates suggests they are 100 years old, perhaps more. In any case, if the parts were repaired or replaced, to some degree, in the course of their use, it is very probable that the repairs would have been made in the original style. So, it was this balance which formed the basis for the restoration of the beam from Bordeaux.

The beam of the great balance in the Customs museum is marked with the letters A.F. According to custom, these letters are the initials of the maker. It is very probable that they refer to Antoine Fournel, Scalemaker and Adjuster to the Mint, who worked in Bordeaux in the period 1780 - 1820.

In Paris, the 'balanciers' (the name for makers and adjusters of weights and balances), were grouped in one community subject to the jurisdiction of the Mint. In most other large towns of the kingdom, the balanciers were similarly controlled by the Mint. However, in Bordeaux the organisation was different. The Mint was only represented by a single balancier. The others, called 'affineurs-balanciers', were answerable to the Jurade (Municipal Assembly), who admitted them by taking an oath, and controlled their activities, furnished their standards and punches, and controlled weights and measures through the police. These peculiarities are explained by the fact that Bordeaux was, for a long period, under English rule, and ever since that period it has enjoyed substantial autonomy which freed it, notably, from the control of the Mint.



The wooden plates are suspended by ropes knotted as shown in the detail. HI = 140cm (55.1") KL = 70cm (27.6") LM = 58cm (22.8").

In the period 1780 to 1790, the balancier to the Mint at Bordeaux was Antoine Fournel. So, it was natural that the revenue collectors commissioned this maker, who was under central control, to make the great beam to serve their purpose.

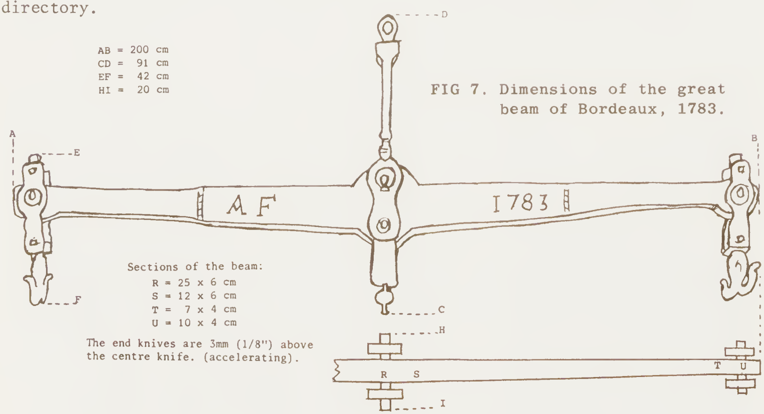
At that time, Fournel's address was "Balancier du Roi, Marché Royal No.5", (Scalemaker to the King). He probably managed a large business, because he made "generally everything that concerns his profession" from "diamond scales to large beams", and he was "adjuster, verifier, and inspector of weights and balances."

Fournel, in his capacity as balancier to the Mint, did not have to swear an oath before the Jurade. But, without doubt, he took steps to become part of the local administration, because his signature is in the Register of the Jurade, in 1792. An undated letter is known, addressed to the municipal officers, and signed by Fournel "Balancier to the King and juryman of the Royal Tribunal of the Guyenne Mint". It asks for permission to set-up as balancier in the town centre.

In the course of the Revolution, the form of his title and his address changed:-

... *Balancier national et de la commune de Bordeaux ... Hotel de la Monnaie et place Brutus No.24.*
... *Balancier national. Fournisseur des armées de terre et de mer ... Rue de l'Egalité, en face de celle des Fossets, No.53, près l'Église Saint-Pierre.*
... *Balancier de la Monnaie, Marché de la Liberté, No.12...*
... *Balancier impérial, Marché Royal, No 12...*

He was still working in 1820, when he was listed in the Bordeaux trade directory.



AB = 200 cm
CD = 91 cm
EF = 42 cm
HI = 20 cm

FIG 7. Dimensions of the great beam of Bordeaux, 1783.

Sections of the beam:
R = 25 x 6 cm
S = 12 x 6 cm
T = 7 x 4 cm
U = 10 x 4 cm

The end knives are 3mm (1/8") above the centre knife. (accelerating).

A Trip to Malta

LOU UIT DEN BOOGAARD

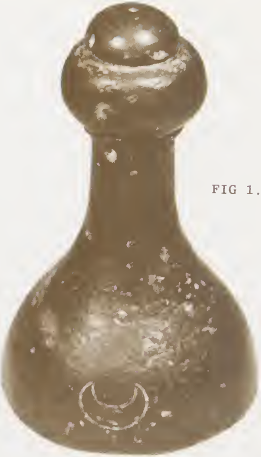


FIG 1.

Going south from Italy across Sicily and out into the Mediterranean sea you will find a little spot - the island of Malta - with its North African neighbours of Libya and Tunisia. Since 1974, Malta has been a socialist republic connected with the Common Market, but self-supporting.

As a result of previous correspondence with the Weights and Measures Department of Valetta, the capital of Malta, I had the name of the Inspector and was able to arrange a visit to his office. The Inspector was extremely helpful and was prepared to answer many of the questions I asked as a collector of old Maltese weights.

Many times I have been told by collectors that a weight cannot be old because it has only one verification mark, but in Malta this is not true. There, such a weight can be 200 years old, as all Maltese weights were stamped only once in a lifetime. Afterwards, they were checked many times but no further stamps were applied. If the weights were not correct they were taken out of circulation. As a consequence there is no help for collectors to date the weights, but if they are bronze, you can be sure that they are old. New weights are the normal knobbed cylindrical design and not the old and very nice model shown in Fig 1.

My visit to the Weights and Measures Department stsrted with the information that since the end of British control in 1979, Malta has had the opportunity to buy in a free market. But it was surprising to hear that a 1 kg iron weight from the Avery factory in England is more expensive than a brass 1 kg weight from Italy. I was not surprised, therefore, to learn that Malta chose to import the Italian weights. Adjusting these modern weights is easy because they have a screw at the bottom and a hole which can be filled with the required amount of lead pellets. You will notice that the weights are from the metric system which was adopted as soon as the island was free from British rule.

The system of old Maltese weights was a special one with the names of ROTOLO and WIZNA.* The mass series of these old weights is shown in Table 1, and my set of weights shown in Fig 2, is nearly complete, only the two smallest ones are missing. Of course, I could have bought the missing weights at the Sunday market in Valetta, but they were modern fakes and very roughly made.

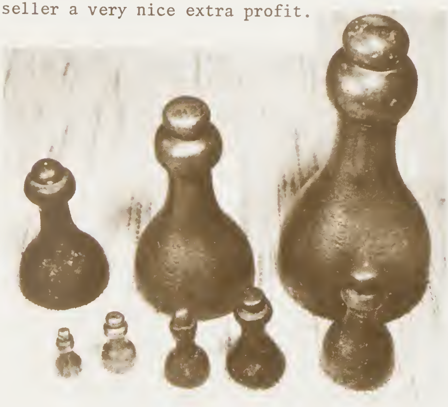
OLD MALTESE WEIGHT SYSTEM

1/60	Rotolo	=	0.5	Maltese ounce	=	13.229	grams
1/30	Rotolo	=	1.0	Maltese ounce	=	26.459	grams
1/15	Rotolo	=	2.0	Maltese ounce	=	52.919	grams
1/8	Rotolo	=	3.75	Maltese ounce	=	99.223	grams
1/4	Rotolo	=	7.5	Maltese ounce	=	198.446	grams
1/2	Rotolo	=	15.0	Maltese ounce	=	396.893	grams
1	Rotolo	=	30.0	Maltese ounce	=	793.787	grams
2	Rotolo	=	60.0	Maltese ounce	=	1587.573	grams
5	Rotolo	=	1.0	Wizna	=	3968.933	grams
10	Rotolo	=	2.0	Wizna	=	7937.866	grams

TABLE 1.

The inspector told me that old weights were made by one foundry called DRAGON, situated in Mseda, another part of the City of Valetta. After the change to imported metric weight, the name of the foundry disappeared from the telephone directory, but it still exists. They are still working on metal repairs, but personally, I think they may be the source of the modern fakes. These are no longer made from bronze but are of brass with a rough finish - sufficient to catch the inexperienced tourist.

I was overwhelmed by the amount of work the inspector is required to do without help. In his office there were three balances, a very large Avery and on the table, an Oertling and a DeGrave. I think they were twenty to thirty years old but still suitable for the job. His guide for permissable tolerances was a thick international handbook which I had not seen before. He showed me a number of trade scales which had been rejected, each one marked with the name and address of the owner who will receive a heavy penalty. It was strange to see that nearly all of these false balances made use of a magnet attached to the frame of the balance so giving the seller a very nice extra profit.



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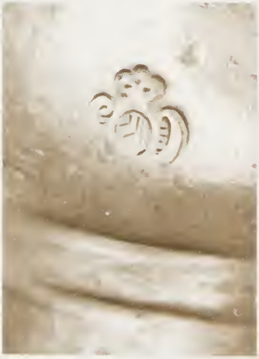

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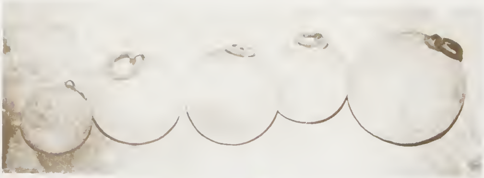


FIG 4.

FIGS 4-6. Scales and weights in the Museum Folklorico.

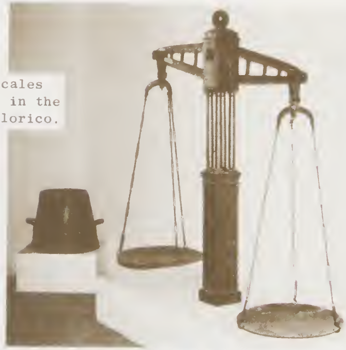


FIG 5.

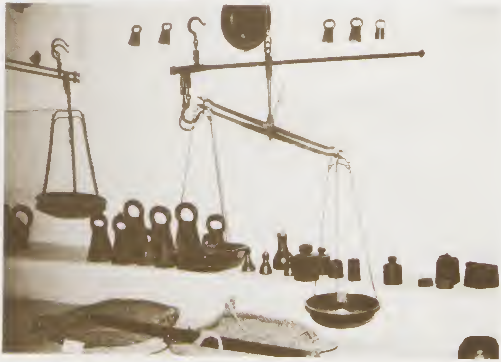


FIG 6.

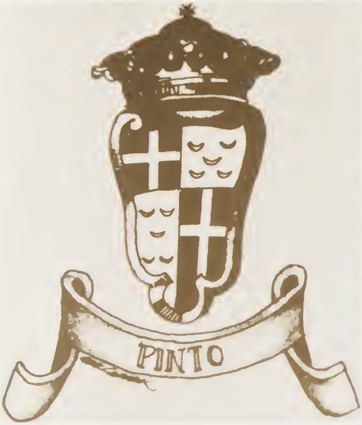


FIG 7. The Pinto arms.

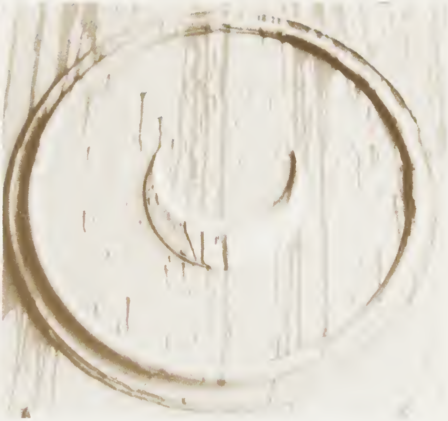


FIG 8. Pinto's motif on the Palace door.

The office was provided with very nice standard weights and measures, both pre-metric and metric, mostly made in England. There was a difference in handling these standards because the Inspector made use of a nice piece of leather instead of the gloves which I have seen used in England.

From the Inspector I got the next address for seeing old Maltese weights and scales. This was the Museum of Fine Arts in Valetta where, down in the cellar, you will find very impressive examples of the first standard weights of the Knights of St.John. It was a great pity that it was not permitted to take photographs, for some unknown reason - they were not selling photographs, slides or postcards from this part of the collections. A very helpful guard was confident that the mark on my oldest Maltese weight was from the coat-of-arms of one of the late Knights, Manuel Pinto de Fonseca, about 1750. This man also gave me an address to visit. It was a small hidden museum in Vittoriosa, another part of the capital adjoining Valetta. The name was the Museo Folklorico, and there we were the only visitors. The warden gave all the help we needed and allowed me to take several photographs of their very nice scales and a lot of rare weights, Figs 4,5 & 6.

The coat-of-arms of Manuel Pinto has for its main symbol, crescent moons lying on their backs. This symbol can be seen on the side of my old weight Fig 1. I heard, from the Ministry of Trade, that there is a palace built by Manuel Pinto, which has the crescent moon on the front door. Now, the palace is the working residence of the Prime Minister and it is strictly forbidden to go inside or even to take photographs, but after discussions with the military guard I was permitted to photograph the moon, Fig 8. ⊳

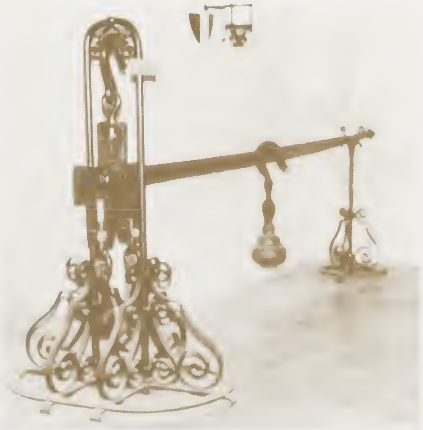


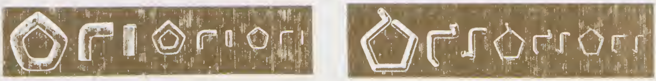
FIG 8. Huge steelyard in the Armoury Palace. Conditions for photography were poor.

Finally, I visited the Armoury Palace where there is the largest steelyard I have ever seen. It was for weighing cannons and could handle 3 tons 7 cwt and 21 lb. The date of this instrument was 1772 and the sliding brass weight is enormous, Fig 8.

Still there remain puzzles which were not answered, but perhaps I can solve them on my next visit; why have the nice bronze weights in the Museo Folklorico got the marks GR and SR ? They are not a design that was made in Britain, so these splendid weights must have been made in Spain or Portugal. Some members of our Dutch Society have similar weights in their collections marked with date stamps of the 18th century.

I hope you have enjoyed this story of my visit to Malta, and if you would like to know more details of the weights and measures please write to me.

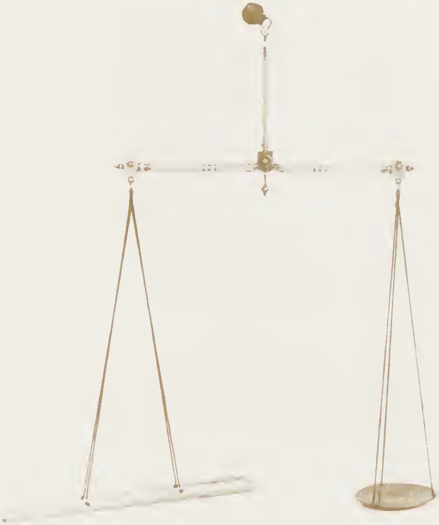
* *If you are interested, I can give you more names from the past for weighing gold, silver, diamonds, wool, and apothecaries weights.*



Analytical weights of coded shape, aluminium, 1,2,5,10,20,50,100,200,500mg. Gottlieb Kern & Sohn, Ebingen, Germany. 1933 catalogue.

Arrow Scales & Weights

Based on the unpublished works of W.A.BENTON, past Curator of the Avery Historical Museum, by kind permission of W.& T.Avery Ltd.



This fine specimen of the very rare arrow scale was used in archery contests, and by archery clubs, for ascertaining the weight of arrows. In judging an archer's achievements it was important to know the exact weight of the arrows used, and this weight was related to the distance fired, and to the strength of the bow.

The balance is a beautiful example of the English scalemakers' art, being constructed of steel, highly polished and exquisitely shaped. It was probably made before 1800, and its elegance suggests that it was made for a private owner, not an arrow maker. The most interesting feature of the balance is the channel-shaped pan, suspended by four cords, for holding the arrow.

The weights used in archery were most unusual, those in this box being made of brass and marked 1, 2, 3 shillings, and 1, 2, 3, 6 Pwt. The larger weights (in shillings) agree fairly accurately with Georgian shillings, namely 92 grains for the shilling. The weight marked 1 Pwt is misleading (i.e. not the 24 grains of a pennyweight). These weights marked in Pwt are approximately equal to the corresponding 'Maundy' coins of 1, 2, and 3 pence and the sixpence of the period. That is, they are the weight of 1, 2, 3, and 6 penny SILVER coins. ▷

The use of weights based on coins for archery was well described by Mr. Crowther-Beynon in *Country Life*, 1938. He said that the weight of arrows is reckoned by the weight of silver coins. Thus 4s to 5s 6d are the lower and upper limits for arrows used by gentlemen, and 2s 6d to 3s 6d for ladies.

Nothing definite is known about the origin of this system, but Roger Ascham in his *Toxophilus*, published in 1545, refers to the custom as being well established in Henry VIII's reign. It is unlikely to have started much before that period because from the Norman Conquest until the second half of the 13th century, the penny was the largest (and almost the only) denomination in our silver coinage. It was not until 1551 that silver crowns and half-crowns were introduced by Edward VI. The difficulties in weighing arrows with silver coins in these early days are fairly obvious, especially as there was considerable fluctuation in the standard weight of the silver coinage throughout the period.

In a book *The English Bowman, or Tracts on Archery*, by T. Roberts 1801, the author gives the following facts regarding the weights of arrows:-

"Arrows are now weighed with the same weights as standard silver, and marked accordingly: so that an arrow equal to five shillings troy or silver weight, is called an arrow of five shillings. This method is attended with many advantages: among others, it enables us to pair arrows to a very great nicety, and to determine instantly what we shall use for any bow and any length. By this means, too, a closer connection is made between the light and heavy woods." He says that the distance or flight of an arrow is measured by yards - an ancient practice - or by roods *"the rood consisting of 7 yards and a half, North country measure: and that distance is termed length."* He gives the following table connecting the lengths and weights of arrows:

LENGTH OF FLIGHT	4 roods (30 yards)	from about 4s to 6s	WEIGHT OF ARROWS
	8 roods (60 yards)	from about 3s 6d to 5s 6d	
	12 roods (90 yards)	from about 3s to 4s 6d	
	16 roods (120 yards)	from about 3s to 4s 6d	

Roberts also points out that Roving arrows are much heavier, being from 5 to 10 or even 12 shillings, and that Flight arrows are much lighter, seldom weighing more than 4 shillings. We also learn that in archery three arrows are called 'a pair' so that if *"one is broke, lost or injured, the archer may have two* (the number used at a time) *left of equal weight."*

Showcase

1. Steelyard table scale (goods plate removed). Beam graduated 0-10 Kg x ½Kg, and the arc graduated 0-500 g.
DIRK SCHMITZ COLLECTION

2 & 3. Simply made pendulum letter balance, c.1946. Graduated 0-1500 grams. Pressed and folded sheet metal, aluminium face.
DIRK SCHMITZ COLLECTION

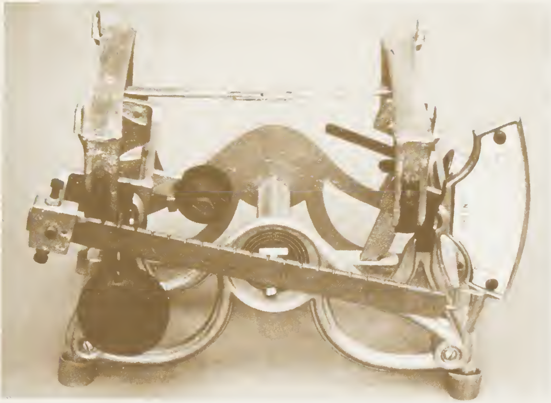
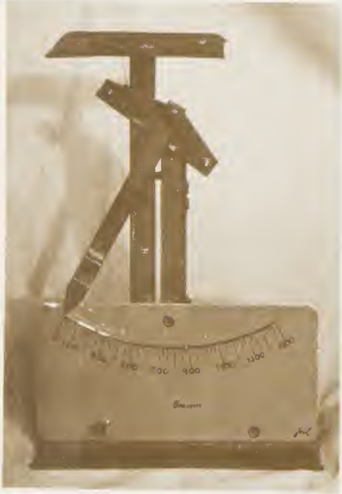


FIG 1.

SHOWCASE



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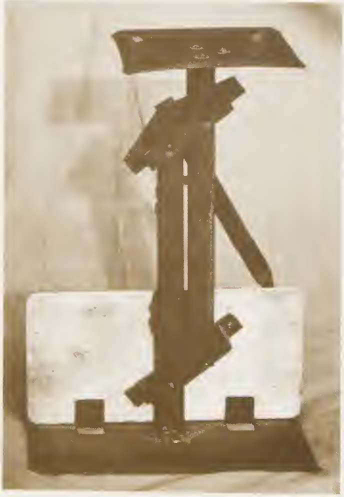

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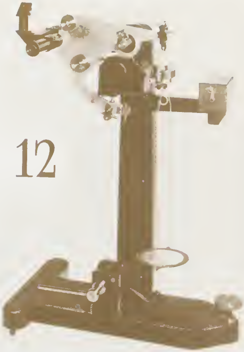


Precision Balance 12

HANS JENEMANN

This is a laboratory balance with oil damping, made by Starke & Kammerer in Vienna, c.1925. It has facilities for weighing from 0.01 to 120 grams, and uses an unequal-arm beam with only two knives. It works according to the substitution principle (see Page 873) in combination with a large inclination range.

The balance has only one pan, which is however, a double pan. The upper one is for the weights which range from 10 to 110 grams, and the lower pan is for the load. The weights, subdivided into 10, 10, 20, 20, and 50 grams, are kept in a little wooden box on a bracket near the upper pan.

The beam of this balance is in the form of a quadrant with the distance from the main knife to the pan knife being 60mm (2.3"). The radius of the quadrant is 105mm (4.1"). On the left of the beam, on the arc, are two disc-shaped counterpoises, and at the bottom of the arc there are screws for adjusting the zero position and the sensitivity of the balance.

Below the main knife there is a small oil-filled box. A little rod with a rectangular plate at the end projects down from the beam and is immersed in the oil. This plate damps the swinging of the beam and acts even more quickly than the air damping of the analytical balance.

The inclination range of the beam is divided from 0 to 10 grams, each half gram being marked with numbers 0, 0.5, 1.0, 1.5 and so on. Between these marks all the 1/100th gram divisions are shown as little lines, those at the fifth and tenth positions being longer. These graduations are observed through a microscope which is attached by a hooked holder in the same manner as the weight box. (The microscope is at the top left of the picture). As it is possible to estimate the half position between the little lines, the reading sensitivity is 0.005 grams.

Arrestment is provided for the pan only, and it is operated by a cam and lever seen at the base of the column at the front of the base.

The base plate is 340mm long (13.4") and can be levelled by a screw at the right hand end. Iron is used for the base, the column and some of the other parts, while the beam is made from aluminium, and a few small parts are of brass.

The mechanical workshop of Starke & Kammerer was founded in 1866 by Gustav Starke and his brother-in-law Carl Kammerer (who was in charge of marketing) in Vienna. Before opening his workshop, Starke was a member of the famous K.K. Polytechnic Institute in which his father Christoph Starke had done much important work. Many astronomical and geodetic instruments were made by Starke & Kammerer, and later, presumably until the end of the 19th century, precision balances were also made. After 1922 the firm became a joint-stock company and finally it went into liquidation in 1941.

* * *

Substitution Weighing

HANS JENEMANN

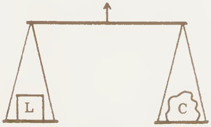


FIG 1.

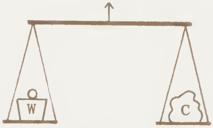
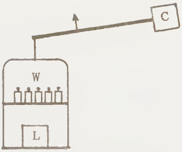


FIG 2.

The substitution principle has been known for a long time as an important method of accurate weighing. It has two main variants, one with a variable load, the other with a constant load on the beam.

The variable load method is mostly conducted on a conventional equal-armed two-pan balance. The load 'L' is put into one of the pans, Fig 1, then any material 'C' is put in the other pan until the balance is in equilibrium. Then the load is removed, and in its place are put weights 'W' until equilibrium is again achieved, Fig 2. These weights must then be exactly equal to the unknown mass of the load.

As any ordinary two-pan balance can be used for this method, it is not possible to find old instruments made specially for this variant of substitution weighing. ▷



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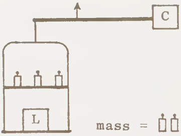
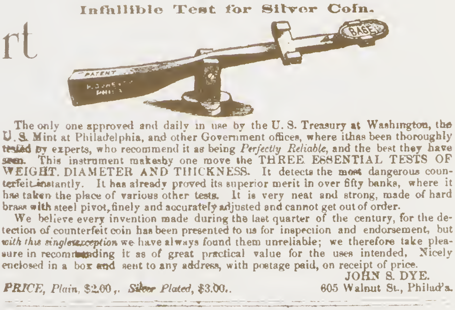


FIG 4.

The second variant with a constant load can also be carried out with a conventional two-pan balance, but it is more practical to use a balance especially constructed for the purpose. With this method, the balance is loaded with the complete set of loose weights 'W', Fig 3. These are exactly counterbalanced on the other side by a constant mass for all weighings. This counterbalance 'C' can be put in the pan of a normal two-pan balance, but usually it is fastened permanently to the end of the beam, as in the modern substitution balance, (see Page 872). Thus, the second pan is not required and can be omitted. For convenience, it is advantageous to have two pans suspended from one knife on the 'weighing side'. They are arranged one above the other, one for the loose weights and the other for the load to be weighed. When the load is in position, some loose weights are removed from the pan until equilibrium is achieved. The sum of the weights removed must be equal to the mass of the load.

By using the substitution method of weighing, the almost impossible task of manufacturing a balance with EXACTLY equal arms is avoided, in fact, the arms may be as different as one likes to make them, with no disadvantage. However, when using the first variant, some errors can occur in the inclination range due to the beam bending to different degrees with the differing loads on the balance. This problem is eliminated in the second variant where the load on the beam is always a constant value. If any bending occurs it is constant in its degree.

Old Advert


PATENT
BASE

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The only one approved and daily in use by the U. S. Treasury at Washington, the U. S. Mint at Philadelphia, and other Government offices, where it has been thoroughly tested by experts, who recommend it as being *Perfectly Reliable*, and the best they have seen. This instrument makes by one move the THREE ESSENTIAL TESTS OF WEIGHT. DIAMETER AND THICKNESS. It detects the most dangerous counterfeit instantly. It has already proved its superior merit in over fifty banks, where it has taken the place of various other tests. It is very neat and strong, made of hard brass with steel pivot, finely and accurately adjusted and cannot get out of order.

We believe every invention made during the last quarter of the century, for the detection of counterfeit coin has been presented to us for inspection and endorsement, but *with this single exception* we have always found them unreliable; we therefore take pleasure in recommending it as of great practical value for the uses intended, Nicely enclosed in a box and sent to any address, with postage paid, on receipt of price.

JOHN S. DYE.
PRICE, Plain, $2.00,. *Silver Plated*, $3.00.. 605 Walnut St., Philad'a.

From 'The Government Counterfeit Detector' November 1877.

Sent in by Eric Newman.

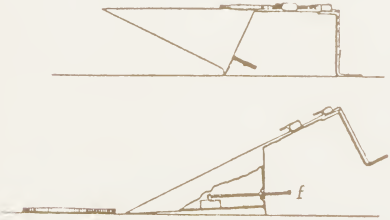
American Patent CCDs

A SERIES ON COUNTERFEIT COIN DETECTORS

GEORGE MALLIS

FIG 17. Thompson's second design with modifications - see Fig 20.

Wiarda's CCD comprises a flat plate set on a knife edge with a triangular counterweight, and a coin stop. The plate is provided with two gauges which control the position of the coin being checked and which will reject any coin of excess thickness or diameter. When in use, the plate is placed horizontally on any flat surface and the coin is placed in the appropriate gauge. A full-weight coin will retain the plate in its horizontal position, but a light coin will be tipped by the counterweight and thus will be rejected.



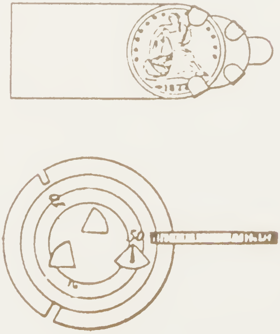


FIG 18.(above) Patent No.188712. 20 Mar 1877. J.Wiarda. A screw 'f' allows for correct adjustment of the counterweight.

FIG 19.(right) Patent No.188982. 27 Mar 1877. J.W.Sutton. A coin is shown in one of the slots, knife in hole for 50¢.

Sutton had a disc of metal provided with a number of slots in the circumference, each corresponding to a particular coin to be tested. On one side of the disc are circular inscribed lines having a diameter equal to the coins to be checked. Adjacent to each slot is a hole into which is put a penknife blade to act as a fulcrum for weighing. Thus, the width of the slot will check the thickness of the coin, the marked circle checks the diameter and the fulcrum tests the weight. A proper coin secured in the slot will tip the device to indicate true weight.

Thompson's second patent uses a single piece of sheet metal bent at one end to stiffen it and provide a counterweight. At the other end a series of hook-shaped projections form five spaces to insert the coins in a vertical plane. A genuine coin will fit the appropriate 'space' and will tilt the balance arm downwards.

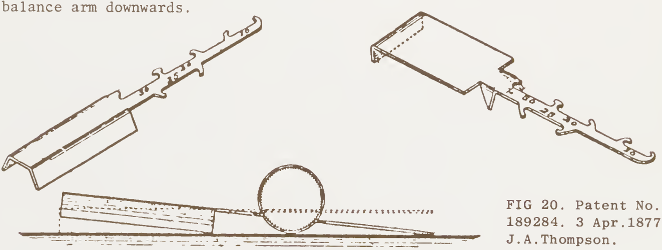


FIG 20. Patent No. 189284. 3 Apr.1877 J.A.Thompson.

Doherty's detector consists of a balance beam with coin gauges and stops attached to one end, and a counterweight at the other end. The device is pivoted on knife edges supported by two short vertical pillars. The gauge checks the diameter of the coin and the bent-over ends check the thickness. Only two coins can be tested, the silver 50 cent piece and the 25 cent piece.

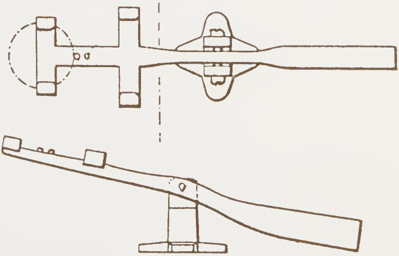


FIG 21. Patent No.192241. 19 Jun.1877. P.Doherty. See OLD ADVERT, page 874.

ANCIENT BALANCE - MODERN ERROR

Lionel Holland has pointed out that his calculated value for sensitivity of the ancient balance should have been 0.017g and not 0.029g, as stated (p.815). He thanks Hans Jenemann for drawing attention to the error.

ISASC

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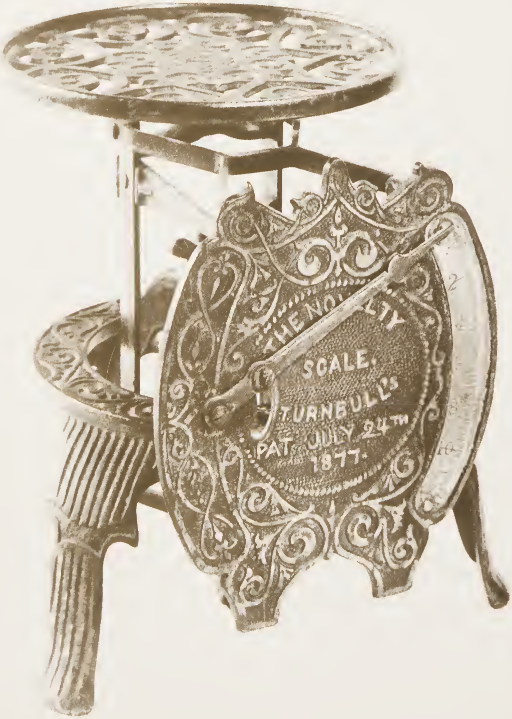
PAGES 877-904



Cover Picture

Cast iron was the material used to make this ornately decorated household spring balance. It was called 'The Novelty Scale' and must have been a pleasing addition to any American kitchen - until food was spilt on it, then the problem of cleaning the decorative shapes and intricate mechanism may have produced less pleasurable remarks! The face is marked 'Turnbull's Pat. July 24th 1877', and the brass arc is graduated 0 - 12 lb x 2 oz.

Courtesy Bill Doniger.

MISSING DEFINITION

PROPORTIONAL WEIGHT - a weight suspended from the end of a loose-weight steelyard*. A proportional weight is much lighter than the load which it weighs because of the unequal arms of the steelyard (and the levers of a platform scale). Thus, if the lever ratio*, or relative proportion, of the arm lengths is 1 to 14, a proportional weight of 1 lb will balance a load of 14 lb, or 1 stone. Also called a PRO WEIGHT, or an EKE WEIGHT (old English).

I accidently omitted this definition from 'A HANDBOOK OF OLD WEIGHING INSTRUMENTS'. Owners of the Handbook may like to take a xerox copy of the definition and glue it to the bottom of page 79. - Michael Crawforth.

HELP AMERICA !

CCD enthusiasts will be interested to see the OLD ADVERT on page 904, which gives the maker of Allender's scales. Please will an American member research I.Wilson of New London, Conn. and let me know when he was working, his address and the nature of his business, for future publication ? Editor.

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Associate Editor—Diana Crawforth

2 Field Close, Yarnton
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English Coin-Weights 1

NORMAN BIGGS

INTRODUCTION

Although English coin-weights have been the subject of several papers, no coherent account of the subject, covering the whole period in which the weights were produced, has appeared. The present series of articles is intended to fill the gap.

It is worth remarking at the outset that the weights themselves may be obtained fairly easily by collectors. Some of the better-known rarities can be expensive, but fortunately the average numismatist is profoundly ignorant on this subject and some very interesting pieces can often be acquired at modest prices. Fortunately also, some of the more absurd pretensions of popular numismatics, such as the preoccupation with superb (that is, unnatural) condition, do not apply in this field.

CLASSIFICATION OF COIN-WEIGHTS

The traditional approach to the classification of coin-weights is by relating the weights to the coins for which they were intended. This is the method used in the standard work by Dieudonné (1). Its advantage is that it enables someone familiar with coin-types to arrange an accumulation of weights in a recognizable order, without having to study the weights themselves in any detail. Dieudonné himself was a museum curator and the attractions of this method must have been very clear to him.

Unfortunately, the traditional method has serious disadvantages from the viewpoint of the scholar and the collector. For example, a set of weights for the English ryals of 1465-1470 might include a weight of English origin made at about the same time as the coin, and a very different type of weight of Flemish origin, made about 180 years later. Not only are these weights incongruously juxtaposed, but each one is separated from the other weights which should properly be regarded as part of the same group. For this reason, it seems worthwhile to adopt an approach based on historical and geographical principles whereby weights produced in the same country at the same time will be grouped together.

The weights to be surveyed in this series of articles are those which were made in England for the coins current in England. This includes weights made in England for coins issued abroad, but excludes weights made abroad for English coins. (The hyphenation in the title 'English Coin-Weights' is chosen to emphasise the distinction from 'English-Coin Weights'). In this context, it is important to recognize that the coinage current at any one time in England might comprise as many as three categories. Firstly, there is the active coinage, consisting of those types being issued (in theory anyway) by the authorities of the time. Secondly, there is the old coinage, issued in earlier times, but still in circulation; and finally there is the alien coinage, issued abroad but frequently used in this country. Of course, all three categories need not be present at once. However, at several periods of English history groups of weights intended for coins in more than one category have been issued together.

In our classification such groups will be considered together, whereas they would be separated in the traditional scheme. By considering the weights in this way it is possible to illuminate many fascinating aspects of English economic history.

THE PURPOSE OF COIN-WEIGHTS

Throughout the period in which coin-weights were used, the coinage was regarded as having an intrinsic value as a consequence of its gold (or silver) content. Thus, a coin which did not contain the correct amount of gold would be worth less than a true coin. When coins were made by hand - hammered coins - they were not perfectly round and small pieces could be removed from the edge by 'clipping' without changing the appearance of the coin significantly. Such a clipped coin could only be detected by weighing. Later, when coins were made by machinery - the milled coins - clipping was much reduced, but natural or unnatural wear could reduce the gold content below an acceptable level.

Thus, the reason for weighing a coin as part of a commercial transaction was to establish its gold content and thence its value. However, the exact meaning of 'value', and its relation to 'weight' was a very complex matter. In the first place, it was impossible to determine the exact weight of a coin by using a single coin-weight, unless, by chance, the two coincided exactly. The function of a coin-weight was to determine if the coin was at least as heavy as a certain specified standard. If it was, then the coin could be exchanged at an acceptable value; if not then it could be rejected as unacceptable or it could be accepted at a lower valuation. The determination of a lower valuation would require the use of a set of small weights to establish the deficiency of the coin, and some means of translating the weight deficiency into monetary terms.

The units of weight for coins in England were the pennyweight and the grain, a grain being equal to 0.0648gm. Despite the apparent precision of standards expressed in such a small unit, it must be stressed that in earlier times it was impossible to produce large numbers of weights accurate to within one grain in a hundred. Consequently, when a clipped or worn coin was tested with an unreliable weight there would be endless opportunities for haggling and double-dealing, and this became an accepted part of commercial life.

In addition to its weight, the value of a coin depended upon the percentage of gold it contained. This is known as the 'fineness' and is measured in carats, 24 carats denoting pure gold. For thousands of years, it has been possible to refine gold to almost total purity and consequently the original standard for 'fine gold' was 23 carats 3.5 grains (99.48%), although it is not clear that this was always achieved in practice. In the sixteenth century, the 'crown gold' standard of 22 carats (91.67%) was introduced, and two standards were used concurrently for over a century, causing much confusion for the people of the time (and the modern collector). No fine gold was coined after 1662, but the fine gold coins were not demonetized until 1732.

Finally, when the weight and fineness of a coin had been agreed, its value had to be expressed in some accepted terms. In medieval times the silver penny was the absolute standard and the value of a gold coin was expressed in terms of shillings and pence (1 shilling = 12 pence). Gradually, the two metals changed status, passing through a long period of bimetallic standards, until the gold standard was proclaimed in 1817. Changes in the bullion price of either metal thus had a profound effect on the coinage throughout this period of confusion.

All the factors mentioned above point to the conclusion that the causes which led people to use coin-weights have been many and various. At one period, people would weigh coins to overcome a particular problem, until in time, this problem disappeared and coin-weights were forgotten. Then another, different, problem would arise, and new weights would be required. The ever-changing economic factors affecting the use of coin-weights in England from 1421 until about 1850 will be surveyed in the next article.

BIBLIOGRAPHICAL NOTE

The first attempt to survey English coin-weights was made by Lawrence (3). This was followed by the book of Sheppard & Musham (4), which contains an extensive list of weights. Unfortunately, the weights on which the list was based were destroyed during the Second World War, and the list itself is misleading in several ways. The book of Dieudonné (1) has already been mentioned. More recently, Houben (2) has written a valuable book, adopting the same classification scheme as Dieudonné, but incorporating a great deal of additional information. There are a few other relevant articles, and these will be cited in subsequent parts of this series.

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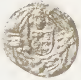
2. HOUBEN G.M.M. : 'European Coin Weights for English Coins' Hub. Tonnauer, Roermond, 1978.
3. LAWRENCE L.A. : 'Coin Weights' British Numismatic Journal, Vol.6, pp 287-303, 1909.
4. SHEPPARD T. & J.F.MUSHAM. : 'Money Scales and Weights' London, 1923. Reprint: Spink & Son, London, 1975.

NOTES ON THE ILLUSTRATIONS

In each case, a brief description of the weight is given first, including its actual weight in grains, diameter in millimetres and the approximate date of manufacture. Details of the coin for which the weight was intended, follow. The figure given for the weight of the coin is the intended average weight of new coins leaving the Mint. At certain times, a lesser figure may have been specified as the minimum acceptable for current coins. Unless stated otherwise, all coins are gold, of 91.67% fineness.

1. Obv: King in ship. Rev: blank. 55gr. 15mm. c.1500. For the half-ryal of Edward IV (1465-70), 60gr of fine gold, 5s.
2. Obv: rose on spur, ornaments around. Rev: crown, XVs, stamped crown over I. 97gr. 17mm. c.1620. For the spur-ryal of James I, third coinage (1619-1625), 98gr. fine gold, 15s.
3. Obv: bust of Charles I. Rev: crown, Xs, stamped crown over C. 70gr. 15mm. c.1630. For the half-unite or double crown of Charles I (1625- onwards) 70gr. 10s.
4. Obv: bust of James I. Rev: crown, XXIIs, signed B (Briot). 155gr. 19mm. c.1633. For the unite of James I, later known as a Jacobus, second coinage (1604-19). 155gr. valued at 22s from 1612.
5. Obv: bust of Charles I. Rev: crown, XXs, 140gr. 19mm. c.1633. For the unite of Charles I, later known as a Carolus, (1625-onwards), 140gr, 20s.
6. Obv: king on horseback. Rev: crown, CR, XXX D, 223gr. 23mm. c.1640. For the half-crown after 1601, 233gr, silver, 2s 6d.
7. Obv: bust of James II. Rev: crown, XXIIs 153gr. 21mm. c.1685. For the unite of James I, as No.4.
8. Obv: busts of William and Mary. Rev: crown with sceptres, 1 GVINEA W. 128gr. 20mm. c.1690. For the guinea after 1663, 129gr. valued initially at 20s but varying up to 28s in the 1690s.
9. Obv: bust of William III. Rev: crown with sceptres, 1 GVINEA W. 129gr. 20mm. c.1700. For the guinea as No.8, value fixed at 21s 6d in 1697.
10. Obv: bust of Louis XIV. Rev: fleur-de-lis, 1 PISTOL W. 105gr. 19mm. c.1700. For the French pistole or Louis d'or. (1643-onwards). 104gr. valued at 17s 6d up to 1701, and 17s thereafter.
11. Obv: RICHARD LITCHFEILD FECIT. Rev: crown with sceptres. 1 GVINEA W. 130gr. 20mm. c.1700. For the guinea, as No.8.
12. Obv: bust of Queen Anne. Rev: crown with sceptres. 1 GVINEA W. 128gr. 21mm. c.1705. For the guinea, as No.8.
13. Obv: bust of John V of Portugal, KIRK 1747 below, Rev: THREE POUND TWELVE, 442gr. 28mm. 1747. For the Portuguese double johannis or 8 escudo piece (1723-1732). 444gr. £3 12s.
14. Obv: Portuguese cross. Rev: A MOIDORE. 165gr. 27mm. 1748. For the Portuguese moidore of 3 escudos, or 4800 reis (1677-1722). 166gr. 27s.
15. Obv: Spanish arms, KIRK LONDON FECIT around. Rev: A DOUBLE DOUBLOON 1749. 417gr. 28mm. 1749. For the Spanish 4 pistole or 8 escudo piece (1728-onwards). 416gr. gold of 87.5% fineness. £3 8s
16. Obv: bust of George II, I.KIRK F below. Rev: A GUINEA. 128gr. 26mm. 1755. For the guinea, 129gr. value 21s. from 1717.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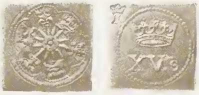

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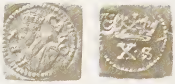

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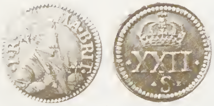

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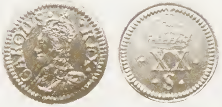

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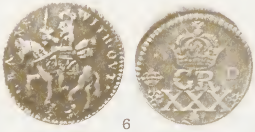

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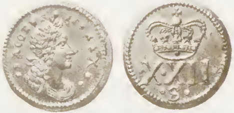

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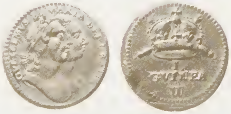

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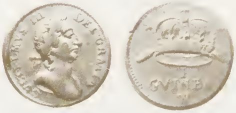

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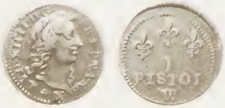

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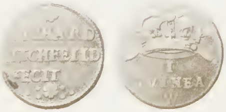

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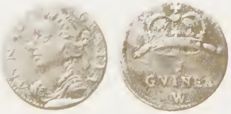

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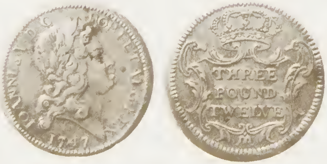

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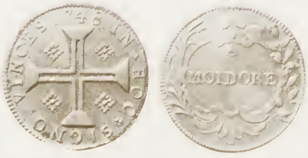

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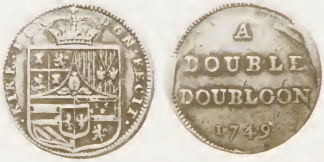

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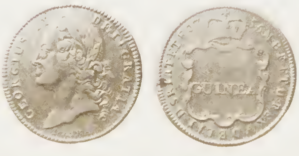

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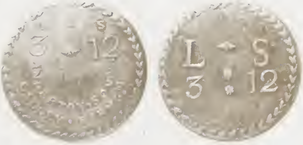

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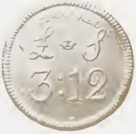

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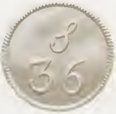

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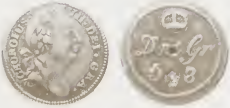

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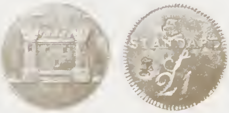

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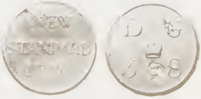

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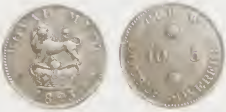

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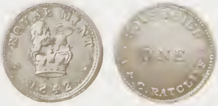

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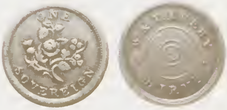

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17. Obv: L3 S12, ANDERTON, SON & CALLEY BIRM^{m}. Rev: L3 S12, 440gr. 29mm c.1750. For the double johannes, as No.13.

18. Obv: STANDARD, small crown, £3 s12. Rev: as obv. 444gr. 27mm. c.1750 For the double johannes, as No.13.

19. Obv: S36. Rev: as obv. 222gr. 23mm. c.1750. For the Portuguese johannes or 4 escudo piece (1723-onwards). 222gr. 36s.

20. Obv: bust of George III. Rev: small crown, Dwt.5 Gr.8, stamped ewer. 128gr. 23mm. c.1774. For guineas coined after 1771. 129gr. 21s.

21. Obv: a castle. Rev: STANDARD, S21, stamped crown and ewer. 128gr. 23mm. c.1774. For the guinea, as No.20.

22. Obv: NEW STANDARD 1776. Rev: small crown, D5 G8, stamped ewer. 128gr. 20mm. 1776. For the guinea, as No.20.

23. Obv: ROYAL MINT 1823, lion on crown. Rev: Cur^{t}.W^{t}. DOUBLE SOVEREIGN. 244gr. 22mm. 1823. For the double sovereign of George IV, 1823. 245gr. 40s.

24. Obv: ROYAL MINT 1842, lion on crown. Rev: ONE SOVEREIGN I.& C.RATCLIFFE. 122gr. 21mm. 1842. For the sovereign (1817-onwards). 123gr. 20s.

25. Obv: ONE SOVEREIGN, rose, thistle and shamrock. Rev: W.& T.AVERY BIRM^{m}. 122gr. 22mm. For the sovereign, as No.24.

Quintenz, Rollé & Schwilgué - the Decimal Scale

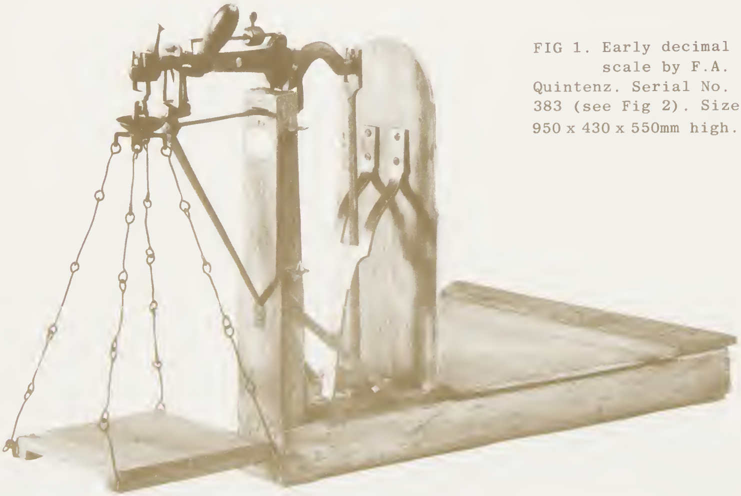

FIG 1. Early decimal scale by F.A. Quintenz. Serial No. 383 (see Fig 2). Size 950 x 430 x 550mm high.

It is difficult to find a technical innovation from the early 19th century which is still used today,* but such is the decimal scale. Old engineering books name Friedrich Alois Quintenz as the inventor, but records are few and biographies differ in their 'facts'.

Quintenz was born in 1774, in Gengenbach, a little free city on the lower region of the river Kinzig. Here, arrived the small rafts from the high Black-Forest, to be put together to form big rafts of coniferous trees ready to float down the river Rhine. Quintenz' father was headmaster of the elementary shool and also a watchmaker - in the Black-Forest district it was common to combine two professions. The Quintenz family belonged to the class of people who could become members of the town council of Gengenbach, and, in 1822, Karl Quintenz was an administrator for the Mayor. According to the parish register for 25th February 1774, Friedrich Alois Quintenz had as his godfather, the councillor Laurentius Zimmerman, and as his godmother, the Baroness Doncilla von Bender.

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*1966

It was of great importance that the young Quintenz was able to attend the latin school of the Benedictine monastery at Gengenbach. Teaching there was very progressive, thanks to the cosmopolitan outlook of the Benedictines. The motto of St.Benedict of Nursia was 'Ora et Labora' - pray and work. In Quintenz' time 'work' included astronomy, mineralogy, physics, chemistry, architecture, mathematics and medicine. A ceiling fresco in the wonderful library of the Benedictine monastery at Admont, in the upper Styrian Ems valley, painted in 1775/6, shows this liberalism. In this painting, physics is symbolised by a female figure holding a balance.

After his studies, Quintenz became a monk and a professor of mathematics and philosophy, which, at that time included the mechanical sciences. However, this peaceful existance was soon shattered by the advance of Napoleon and his new administration, so Quintenz left the monastery and went to live in Strasburg, the spiritual capital of Alsace and the Middle Baden region. There, he tried to design a new hemp-spinning machine for which Napoleon had offered a prize.

Eventually, Napoleon was defeated, and by that time Quintenz was in St. Blassien, in the Black-Forest, as a director of a manufacturing company. He was probably asked to go there as a result of his work with spinning machines, and for his many other abilities; but he had not yet designed a weighing machine.

Soon afterwards, Quintenz received an order from the Baden Government to manufacture platform scales for waggons, and to erect them on main roads. As a result of this experience, he designed a small portable platform scale to take advantage of the convenience of proportional weights. The ratio of this proportion was 100:1 - the centesimal system. Doubtless, Quintenz saw the convenience of this ratio for the metric system which was, by that time, widely used in France.

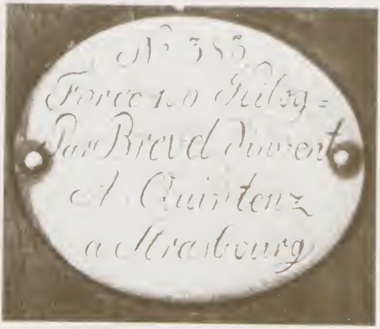


FIG 2. Serial number plate on Quintenz' scale.

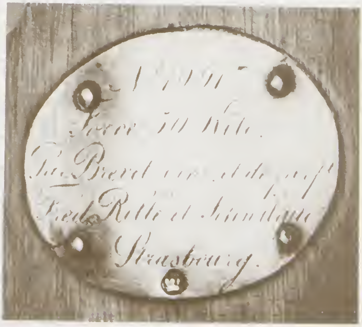


FIG 3. Serial number plate on Rollé & Schwilgué scale.

In order to realise its potential, Quintenz asked his friend Frederic Rollé in Strasburg for help. Rollé was a banker and he saw good commercial possibilities in Quintenz' scales. So, in 1818, he helped to find a workshop in Grafenstaden, south of Strasburg. In 1820, Quintenz applied to the French Ministry for a patent for his "Bascule portative" - a portable platform scale, with centesimal gear. But, the application was turned down because the design was considered too similar to the scale of Sanctorius, and there were two similar models made by Monsieur Merlin who, at that time was a mechanician in London. This set-back did not deter Quintenz. He concentrated his efforts on designing a scale with a triangular platform and a ratio of 10:1 - the 'decimal scale'. He re-applied for a patent and, on 9th February 1822, his request was granted by patent document No.2048. Alas, poor Quintenz contracted pneumonia and died only nine weeks later.

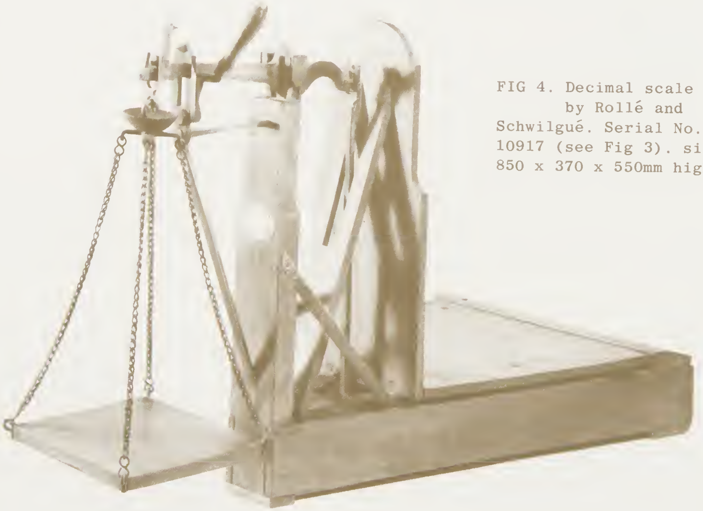


FIG 4. Decimal scale by Rollé and Schwilgué. Serial No. 10917 (see Fig 3). size 850 x 370 x 550mm high.

After the sudden death of the inventor, Rollé, who was a banker, not an engineer, had to find another partner for the Grafenstaden-based company. The new man was Jean-Baptiste Schwilgué, who became famous for his restoration of the ancient astronomical clock in Strasburg cathedral. He was born in Strasburg in 1776. His father, who was Attaché to the Royal Administration of Alsace, lost this position during the first days of the French revolution. He moved, with his family, to the more peaceful Schlettstadt. But there, the schools were also closed, so young Schwilgué had to teach himself. He studied mathematics, astronomy and physics, and earned a living by making watches and surveying instruments. In 1818, he became a teacher of mathematics, and then became a professor and a weights and measures inspector.

In September 1822, Schwilgué moved his family to Strasburg and became the partner of Rollé. He studied Quintenz' scales and decided to redesign the system of levers. Quintenz, perhaps intentionally, had used a complicated system which could only be adjusted properly by initiated persons. Schwilgué also took out a patent, in 1823, for an arrestment gear for the scales, and in 1825, Rollé took out British patent No.5290, in the name of his patent agent Johann Georg Deyerlein.

Other manufacturers tried to find a gap in the patents. Quintenz had only applied for a portable scale, not a mobile one. So, Jean Joseph Fayard obtained a patent, No.4228 of 1829, which put the Quintenz scale on wheels and made it mobile. This idea was used by Rollé & Schwilgué and it marked the beginning of prosperity for their Strasburg-Grafenstadt Engine Company. In 1841, they began to manufacture machine tools, and in 1852, steam engines. Thus started what has become the well-known company the Société Alsaciènne de Constructions Mecanique.

Schwilgué had always had an ambition to restore the clock in the cathedral of his home town, Strasburg. The clock had stopped when he was four years old, and had never been repaired. In 1821, he went to Paris to explain his desire to Louis XVIII, but, in spite of a graceful reception by the King, he was not able to fulfil his wishes until 1839. The restoration was completed in 1842, and having achieved his life-long ambition, Schwilgué retired. He died in 1856, nearly 80 years old.

What was Quintenz' contribution to the techniques of weighing ? Platform scales had already been invented, and Quintenz' rectangular centesimal scale used levers already devised by Merlin. Quintenz' ingenious idea was the decimal ratio for a platform scale and the triangular lever system, which cleverly used the platform as a lever. By using only three static suspension points, torsional errors were reduced and the scale was readily portable, remaining accurate even after many journeys being picked up and set down. Even today (1966), the German Weights & Measures regulations permit this type of platform scale, made chiefly of wood with a few metal parts.

This article is a free translation from the beautifully illustrated book 'Zehntausand Jahre Waage' by K.E.HAEBERLE, and is published by courtesy of Bizerba-Werken, Wilhelm Kraut KG, Balingen.

The Editor is indebted to CARL MOENNIG for his kind help in translating from the original work, and to HERBERT GRIESSHABER for his excellent photographs of two important examples of early decimal scales.

Contemporary Comment

14th July 1869; Evidence given by James Strugnell, police officer and Weights and Measures inspector, to the Standards Commission:-

'Are there many places in Lincolnshire where weights and measures are made ? ▷

I do not know of any...Old weights and measures are repaired...by such persons as gas-fitters or ironmongers. If there is a handy-man in a town, he will take to the repairing of weights and measures, and they are sold in country places, principally by ironmongers. **Are the weights generally sent to those ironmongers in a rough state, and do they adjust them themselves ?** *Yes, that is the common practice,...They run in the lead themselves and japan the weight over...'*

Making Scales

ILLUSTRATIONS SUPPLIED BY HERBERT GRIESSHABER
COMMENTS BY MICHAEL CRAWFORTH

TRADE MARK

The following illustrations show further views of the Schnellwaagen-Fabrik G.M.B.H. and some of their products made in the 1930s. (other views were shown in EQM pp 844-847). The photographs show the extensive facilities used by this company to finish, test and dispatch the many thousands of scales produced.

FIG 7.

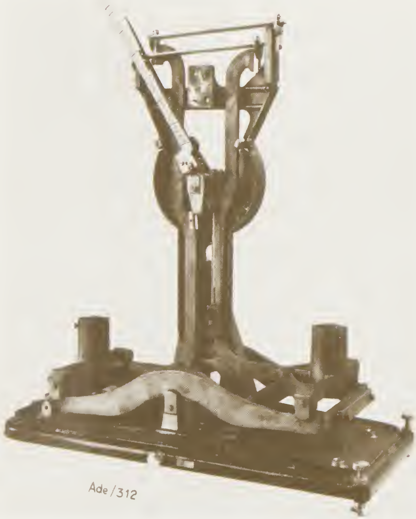


FIG 8.

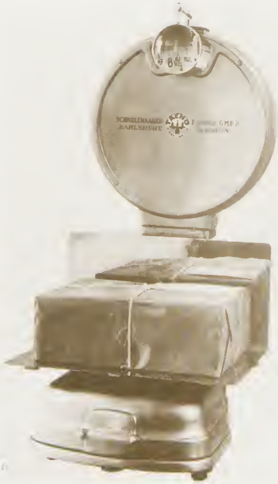


FIG 7. COMPUTING SCALE: The interior mechanism of this inverted roberval scale is clearly shown with the long vertical 'legs' passing up the centre of the casing to stays at the head of the fan face. There is a pointer on the customer's side and a price computing indicator on the shopkeeper's side.

FIG 8. PARCEL SCALE: Accurate reading of the weight was made possible by the powerful magnifying glass attached to the head of the scale.

FIG 9. FAN SCALE: The cover has been removed to reveal the pendulum resistant attached to the half-beranger (?) mechanism supporting the cross for the goods plate. Capacity was 1 Kg. The pointer is forked to read on both the customer's and shopkeeper's side.

FIG 10. PAINT SHOP: Women in the foreground and left rear are cleaning and preparing scale casings for painting. At the centre rear, men are stacking painted parts ready for stoving. To their right, two men are spraying paint in small extraction booths.

FIG 11. FINAL ASSEMBLY: Men in the foreground are setting-up and adjusting the scale mechanisms using weights - they are shown here with 10 kg on each side. Forty-nine people are visible in this view !

FIG 12. TEST ROOM: A clean and tidy room is being used for testing and certification of finished scales.

FIG 13. PACKING ROOM. Women are wrapping and packing scales for delivery to customers. The scales are partly dismantled for packaging.

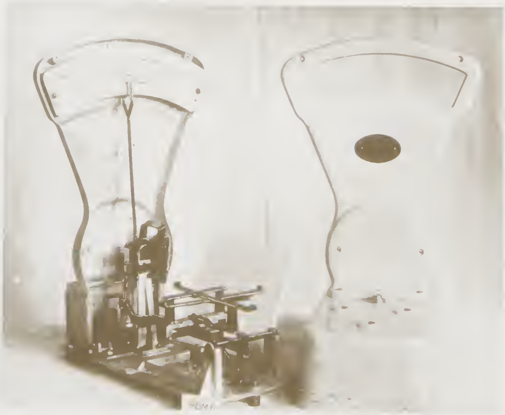


FIG 9.

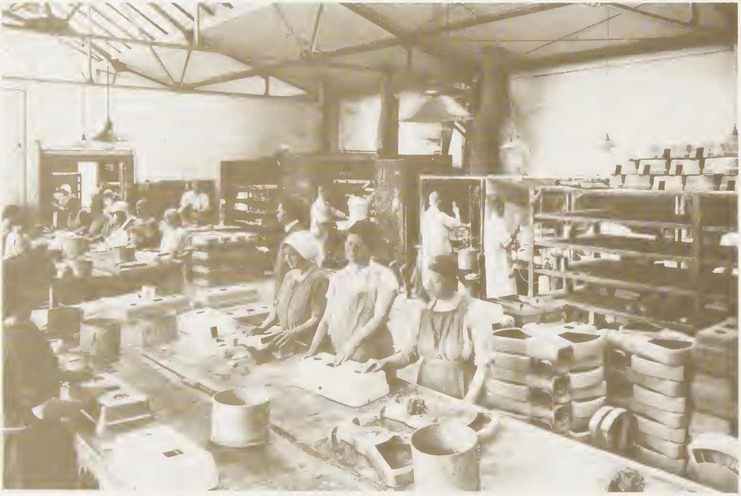


FIG 10.

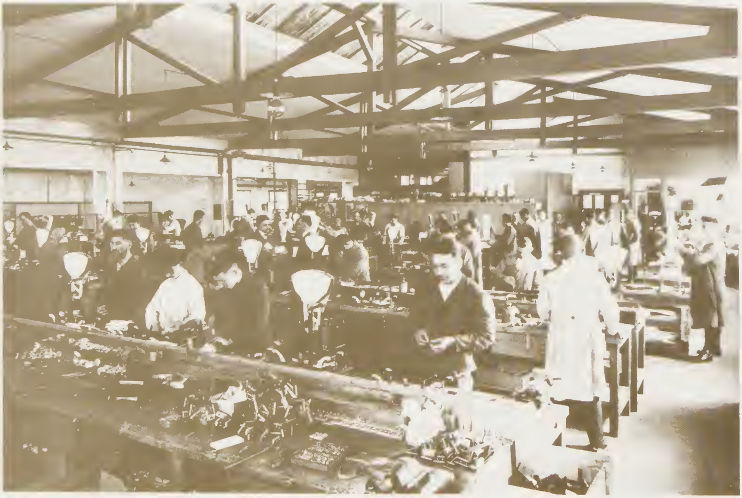


FIG 11.

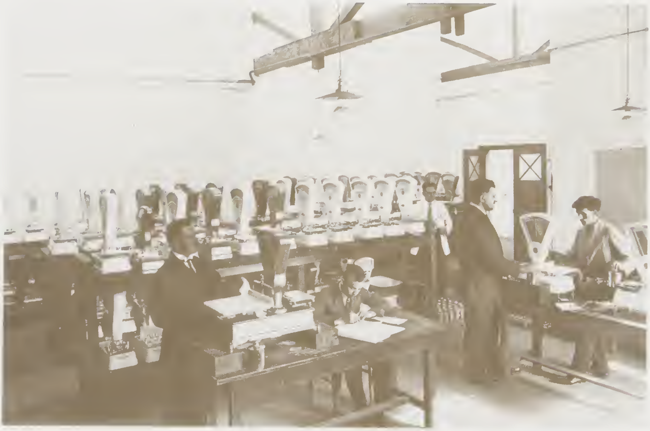


FIG 12.

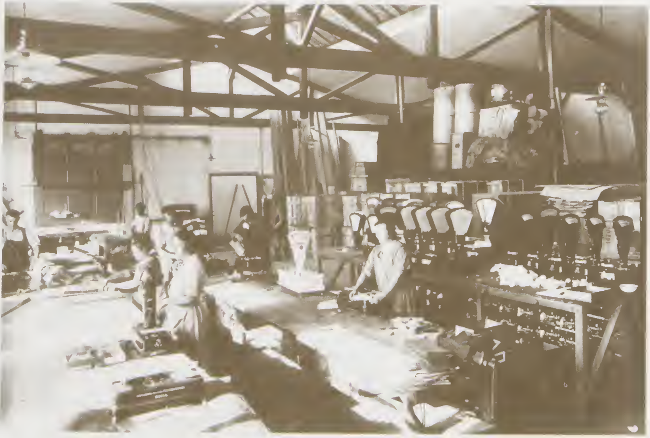


FIG 13

Letters

APOTHECARY'S WEIGHTS

I wonder if I might offer a few comment on your article 'English Apothecary Scales and Weights Part 2: Weights'

FIG 1. To those members unfamiliar with British script of the 19th century and earlier, it might be mentioned that the 'ſs' is a combination of the long 's' and the short 's', such combination being the usual way of writing the double 'ss'.

FIG 2. Whereas i and j are both methods of writing the figure 1 in Roman numerals, they are not used indiscriminately. The j is always the final 'one' in a set, e.g. j, ij, iij, or j, ij, iij

FIG 5. Most of the few aluminium weights that I have are stamped on the broad edge; a 2 drachm, 1 drachm, and ½ drachm are all stamped - V♔R 21 LCC

Another 1 drachm is stamped G♔R 4 LCC and a 1 scruple with the date 12. ♔ GR 66

As you can see from the marks, all were stamped in London.

FIG 10. All my stamped weights of this style carry London verification marks which points to a London maker.

FIGS 21, 28 & 30. Have you noticed that the obverse of these three are all very similar, even to the 'half dram' denomination variation ? Secondly, they show a common error, the half dram and half scruple being shown ʒfs and ℈fs, i.e. fs instead of ſs or ss . Did the same maker produce them all ?

FIG 23. In a set of this pattern, the 2 drachm to ½ scruple are as you show them, but the 4 drachm on one side bears the symbol ℥ß . The ß is, of course, the character for 'ss' in German, and directs our attention to a manufacturer from that country. Incidentally, I believe your Fig 34 is from the same stable. While we are looking to the Continent for makers, could we include J.L.B. in the search ? The German word for ounce is unze, which is not too far away from ounzes.

I have some concave-sided rectangular weights, the only mark being the denomination in the style of your Fig 1. However, along with these came most of the grain weights and these are of similar shape, but with a line of dots immediately within the slightly raised rim. The figures and letters of the denomination are repoussé, as are the dots. The 2 grain and 1 scruple are concave-sided squares, as are, persumably, the 1 grain and half scruple.

In addition to those you describe and illustrate, I have numerous knobbed cylindrical weights of 10oz, 8oz, 6oz, 4oz, and 2oz. After reading the article I am left wondering for what purpose, and by whom, they were used.

If, as you say, the Medical Act of 1858 made Apothecary weights illegal, why are so many verified weights in existence ? It may be that a few dispensers used metric weights in the 19th century, but up to the mid 1950s not one dispenser did I find in multiple or individual retail chemists, or in manufacturing chemists, using anything but Apothecary weights and measures.

Geoffrey Newall.

REPLY

Thank you for your most interesting comments and queries about my article. I'm sure members will appreciate further explanation of the letters used on the weights. Actually, the ʒſs you describe as a mistake, is not an error (in my example). If you look carefully at Fig 21, the letter is 'ſ' which is the traditional printer's alternative to 'ſ' the long 's'. It differs from the 'f' only in the cross-bar does not pass through to the right of the vertical stroke stroke, i.e. ſ = s, f = f.

Your point about 'ß' as 'ss' or 'ſs' is most interesting and may well point to Germany (or to a German immigrant). I have not seen 'ß' on an otherwise English weight. However, we should remember the common roots of our culture with other European countries. The apothecary symbols are very old and seem to be common to all nations of western Europe.

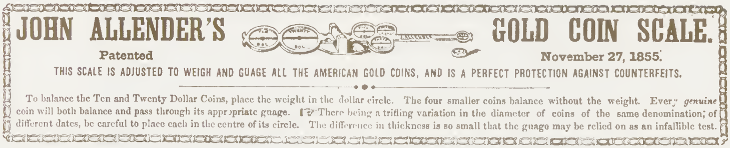
The mystery of JLB has been with us for a long time. Albert Rangeley has put forward a candidate 'John Lines, Birmingham' who was a prolific maker of all kinds of small brass goods. However, the recent appearance of JBB makes this less likely. Can our Continental members help - was JLB a manufacturer in Germany, Holland, France ...?

If you check my article, page 827, I said "In spite of...the abolition of apothecary weights by the Medical Act of 1853, the use of drams and scruples continued." and on page 828, I drew attention to the Act of 1878 and the new standard for apothecary weights of 1879, to show that the weights continued in use, and, after that date, could be officially stamped. Your point about continued use in the 20th century is born out by the Inspector's handbook of 1939 which still included a table of permitted tolerances for apothecary weights.

Your 10 to 2oz knobbed apothecary weights emphasise the many anomalies in the history of apothecary weights, and it appears that much is yet to be revealed. The official organisations which you would expect to know the answers - The Society of Apothecaries, The British Pharmaceutical Society, The British Medical Association Library, and the Wellcome Institute for the History of Medicine - do not know. However, they may have extensive evidence yet to be dug out of their archives - a nice project for some enthusiastic researcher !

Michael Crawforth.

Old Advert



JOHN ALLENDER'S GOLD COIN SCALE.

Patented November 27, 1855.

THIS SCALE IS ADJUSTED TO WEIGH AND GUAGE ALL THE AMERICAN GOLD COINS, AND IS A PERFECT PROTECTION AGAINST COUNTERFEITS.

To balance the Ten and Twenty Dollar Coins, place the weight in the dollar circle. The four smaller coins balance without the weight. Every *genuine* coin will both balance and pass through its appropriate guage. ☞ There being a trifling variation in the diameter of coins of the same denomination; of different dates, be careful to place each in the centre of its circle. The difference in thickness is so small that the guage may be relied on as an infallible test.

Showcase

1. Trade token by James Kirk, St.Paul's Churchyard, London, c.1750. Tokens were a means of advertising as well as being substitutes for money. They were commonly worth one penny at the shop of the proprietor.

   MICHAEL ROBINSON COLLECTION

2. Commemorative weight. b) coat-of-arms of the Founder's Company with dates commemorating their 600th anniversary 1365-1965. Motto 'God the only Founder'. c) around the sides 'THE WORSHIPFUL COMPANY OF FOUNDERS'. d) underside marked 'Beardmore & Co. London W1' and stamped with the Founder's verification mark, the ewer.

   MICHAEL CRAWFORTH COLLECTION

3. Letter balance in the form of a pulley-block used with ropes aboard ship, hence the rope and anchor decoration in the centre of the face. Made from rosewood, ivorine and silver. Graduated 0 to 2 oz. The illustration is about 1½ times full size and the loop at the top allows the balance to be worn as a pendant on a necklace.

   BOB STEIN COLLECTION

4. Balance and stamp box made of silver. The drawer in the base was used to hold postage stamps.

   LOU UIT DEN BOOGAARD COLLECTION

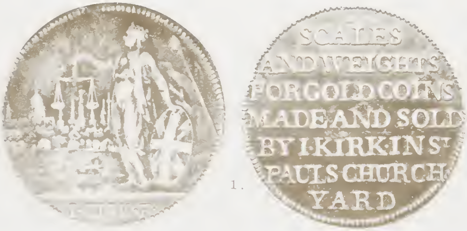
5. Parcel balance of unusual construction with a spring curling round in a large loop behind the face - see inset. The accuracy is said to be similar to conventional spring balances. Graduated 1 to 7 lb, which indicates a date of c.1884. Two examples are known.

   LEWIS WEISS COLLECTION

6. Proportional weight, probably used with a loose-weight steelyard. Made from cast iron. (For explanations see page 878, and see A Handbook of Old Weighing Instruments, pages 10, 13 & 74).

   MICHAEL ROBINSON COLLECTION

SHOWCASE



1.

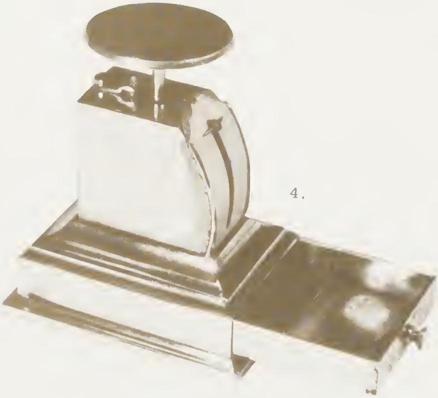
2b.

2c.

2a.

2d.

3.



4.

SHOWCASE

5.

6.

Entertaining Trade Cards

LEWIS WEISS

Before the advent of television, one source of entertainment was scrap books, or picture albums, which provided amusement and pleasure in the late 19th century. People enthusiastically collected scraps, pictures and trade cards to enter into their albums.

Thus, trade cards were a powerful advertising medium, because they were also popular entertainment. They were put out by national and regional manufacturers of all kinds of products, to be given away to potential customers (1). According to one account, a trade card collector, who went to Philadelphia for the Centennial Exposition of 1876, picked up every card he could find at the show - and he came away with nearly 50,000 different kinds (2). *[How did he carry them ? They would weigh about 180 lb, 82kg. - Ed.]*

Fairbanks and Howe Scale Companies were two firms who, at this time, produced pretty coloured trade cards about the size of a postcard, seven of which are illustrated here.

Fig 1 is listed in 'A Visual History of Trades and Professions' as having a date c.1876 (3), and it has on the reverse side a list of the various Fairbanks Companies and their offices:-

Fairbanks & Co: New York; Baltimore Md; New Orleans; Buffalo NY; Albany NY; Montreal; St.Louis Mo; London, Eng.
Fairbanks, Brown & Co: Boston Mass.
Fairbanks & Ewing: Philadelphia.
Fairbanks, Morse & Co: Chicago Ill; Cincinnati O; Cleveland O; Pittsburg Pa; Louisville Ky.
Fairbanks & Hutchinson: San Francisco Cal.

Fairbanks put out a booklet in 1980, to celebrate their 150th anniversary, with a scene on page 16 similar to Fig 1, and the illustration on page 12 resembles the figure on Fig 2. So, very likely they are reproductions of Fairbanks trade cards.

Barnum's white elephant arrived in New York in 1884, so Fig 3 is probably a later trade card than Fig 1. The elephant was controversial in the USA because, although he was an albino with pink eyes, and was advertised by the great showman as 'white', much of his skin was grey (4). He was also controversial in his homeland, Burma, because the Burmese people believed that dire calamities would overcome them if they allowed a sacred white elephant to leave the country (5).

Fig 4 is a superb blending of the symbolic figure of Justice with children representing Europe, Africa, China and the Americas, and a smokey factory with men sweating over an anvil, symbolising the hard work needed to produce their scales. ▷

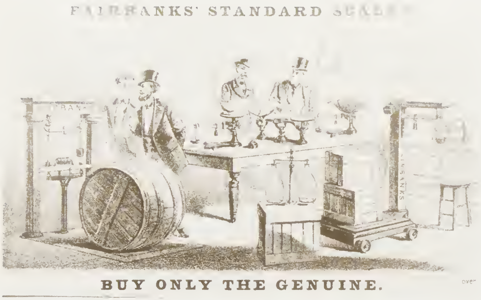
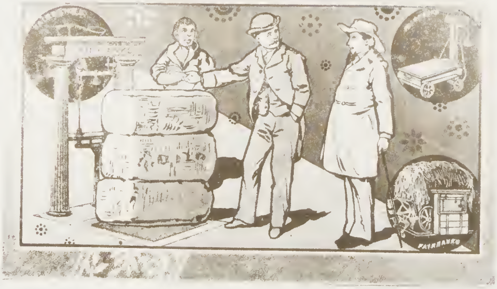


FIG 1.

FIG 2.



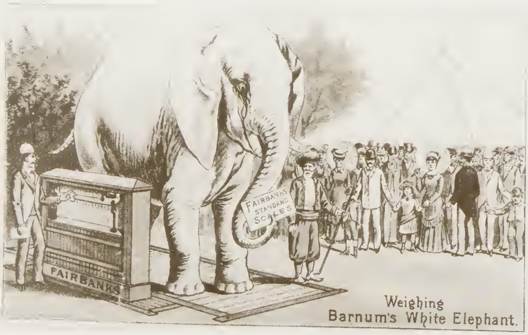


FIG 3.

Whilst the Fairbanks Company tended to appeal to the pride and patriotism of their customers, Howe Scale Company appealed to the sense of humour. Fig 5 shows three mischievous children attempting to weigh a lively pig who is more interested in sweet corn than in standing still to be weighed. Fig 6 shows the whole world being weighed, propped up by a farmer and a business man.

Fig 9 shows the serious side of a Howe trade card, with a space for the agent's address, which reverses to the humerous side, Fig 7, showing "A Light Weigh". This unfolds to show Fig 8 a less happy husband needing a platform scale to weigh his wife - "A Heavy Weigh". These folding cards were very popular, and frequently demonstrated what people were like before and after using a specific product (6). This metamorphosis was not very appropriate to the use of scales, but what amusing visual jokes they made in their series "The Ways of the World".

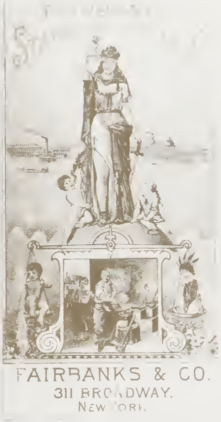

FAIRBANKS & CO.
311 BROADWAY.
NEW YORK.

FIG 4.

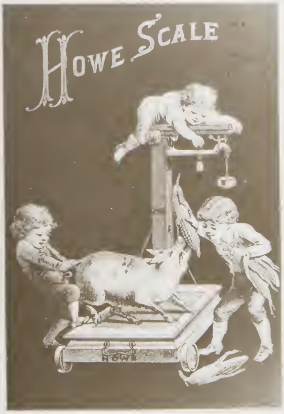


FIG 5.

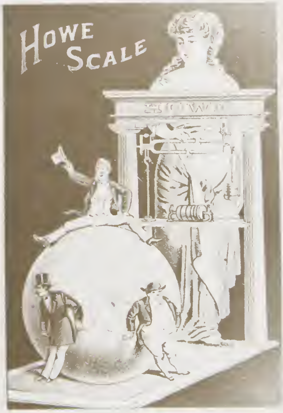
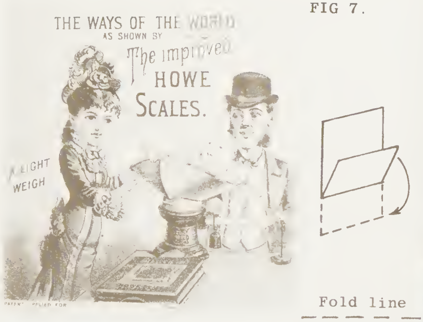
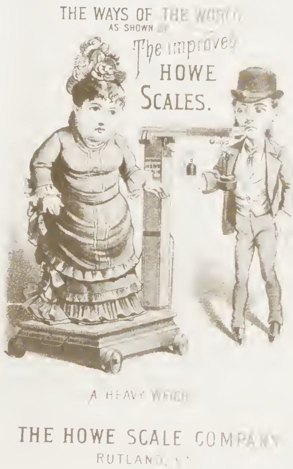


FIG 6.

FIG 7.





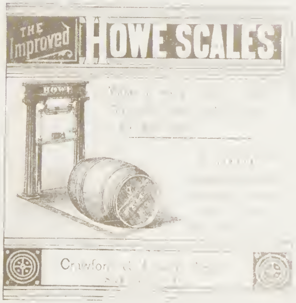


FIG 9.

FIG 8.

Other companies, including Angledile, Wilshire, and Buffalo, published these fascinating hand-outs, and they may be found on postcard stands at antique fairs.

REFERENCES

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2. Ibid: p.112.
3. MOBLEY William Frost: 'A Visual History of Trades and Professions' Wilbraham, Mass. 1981.
4. WALLACE I.: 'The Fabulous Showman; the Life and Times of P.T.Barnum.' Published 1959, p.296.
5. NORMAN A.E.: 'P.T.Barnum; the Greatest Showman on Earth' Chelsea House, New York, 1983. p.436.
6. BURDICK J.E.: 'The American Card Catalogue' Nostalgia Press, Franklin Square, New York. 1967, p.19.

ACKNOWLEDGEMENT

The author gives special thanks to Mrs.Lita Solis-Cohen for assistance.

N.B. See EQM p.p.179-185 for further information on this subject - Editor.

American Patent CCDs

A SERIES ON COUNTERFEIT COIN DETECTORS

GEORGE MALLIS

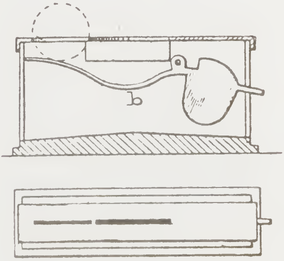


FIG 22. Patent No.195451 25 Sep.1877 E.Kronenberg. Left: coin entering the slot. Right: coin rolling out of the end having tipped the beam 'b'.

Kronenberg's detector was a boxed device with slots at the top to receive the coins to be checked. Inside was a counterbalanced beam acting on a pivot pin. The width and length of the slot would allow the passage of coins only if they were of proper thickness and diameter. The beam would not tip for a lightweight coin. A genuine coin tipped the beam and allowed the coin to pass through the device and roll out of the open end. (This detector was illustrated in EQM page 763, Fig 3).

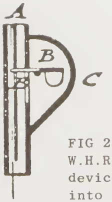
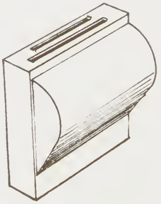


FIG 23. Patent No.196168 16 Oct.1877 W.H.Rice. Left: section through the device showing the beam 'B' projecting into the slots, 'A'. Cover 'C'.



Rice had a thin rectangular box with slot gauges for two coins in the top. A counterbalanced beam was set into the side of the box with its end projecting into the box below the slots. The counterweighted end was protected by a curved cover attached to the box. The coin to be tested was dropped into the appropriate slot to be gauged. If it was genuine, it tipped the beam and fell out of the open bottom of the box.

Probably the most unusual of all the designs patented was Baker & Simonton's plain zinc washer. According to the patent, the washer worked by galvanic action between dissimilar metals. In use, the washer was placed over the gold or silver coin and then the tongue was inserted into the hole of the washer touching the coin. The saliva in the mouth conducted a slight electric current in genuine coins and this was detected as a tingling sensation on the tongue. Base metals produced no noticeable effect.

FIG 24. Patent No. 202691 23 Apr.1878 A.J.Baker and J.W. Simonton.

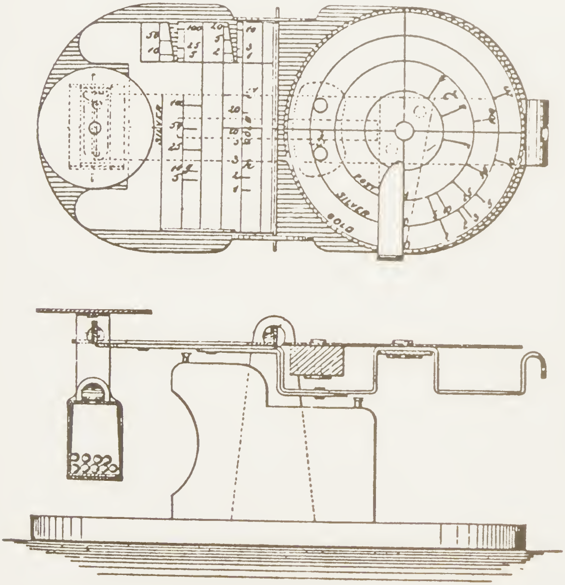


FIG 25. Patent No. 203057 30 Apr.1878 H.Maranville. The patent shows a plate for weighing coins, letters, and other small objects. In production, this was omitted, and a much smaller base was used. See Old Advert, page 904. Also, the weight-disc was mounted under the beam not on top as shown in the drawing here.

Maranville's third CCD had a flat beam with a metal disc mounted at one end. The disc carried a counterweight at one side so that as the disc was rotated the position of the weight was changed relative to the fulcrum of the beam (in principle, a sort of steelyard), Fig 25. The patent called for a small scale-plate, of the mass-stabilised type, to be pivoted at the other end of the beam. This was to be used for weighing the coins, letters, or any other small articles, and the weighted disc was to be graduated in ounces as well as for specific coins. However, the author has not seen this version of the Maranville design.

In production, the CCD had no scale-plate; the disc was mounted below the beam (not above) and the base was reduced to a small strip of bent sheet brass, making the instrument very compact for the pocket, Fig 26. At one end of the beam there were graduations to check the diameter of the coin when it was placed against the upturned end of the beam. The thickness of the coin was tested in V-shaped gauges at the sides of the beam. Having tested the size of the coin, and turned the disc to the correct setting, the coin was placed against the upturned end of the beam. If genuine, the beam tipped down.

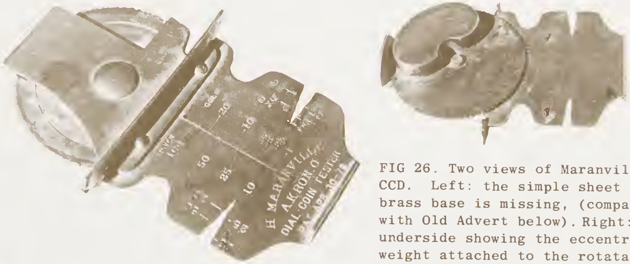
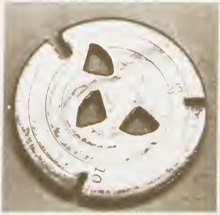


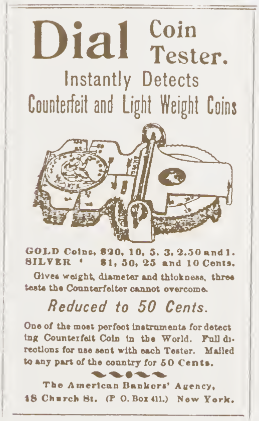
FIG 26. Two views of Maranville's CCD. Left: the simple sheet brass base is missing, (compare with Old Advert below). Right: the underside showing the eccentric weight attached to the rotatable disc.

FIG 27. Below: Sutton's circular CCD, as described in EQM page 875.



Old Advert

Left: from Underwood's Counterfeit Reporter, Sep.1895. *Sent in by Eric Newman.*
Below: from the lid of CCD box.



Dial Coin Tester.

Instantly Detects
Counterfeit and Light Weight Coins

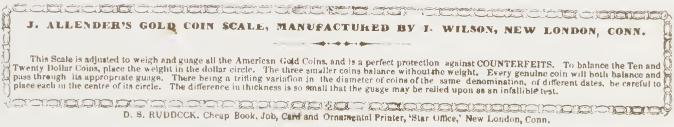
GOLD Coins, $20, 10, 5, 3, 2.50 and 1.
SILVER ' $1, 50, 25 and 10 Cents.

Gives weight, diameter and thickness, three tests the Counterfeiter cannot overcome.

Reduced to 50 Cents.

One of the most perfect instruments for detecting Counterfeit Coin in the World. Full directions for use sent with each Tester. Mailed to any part of the country for 50 Cents.

The American Bankers' Agency,
18 Church St. (P O. Box 411.) New York.



J. ALLENDER'S GOLD COIN SCALE, MANUFACTURED BY I. WILSON, NEW LONDON, CONN.

This Scale is adjusted to weigh and guage all the American Gold Coins, and is a perfect protection against COUNTERFEITS. To balance the Ten and Twenty Dollar Coins, place the weight in the dollar circle. The three smaller coins balance without the weight. Every genuine coin will both balance and pass through its appropriate guage. There being a trifling variation in the diameter of coins of the same denomination, of different dates, be careful to place each in the centre of its circle. The difference in thickness is so small that the guage may be relied upon as an infallible test.

D. S. RUDDOCK. Cheap Book, Job, Card and Ornamental Printer, 'Star Office,' New London, Conn.

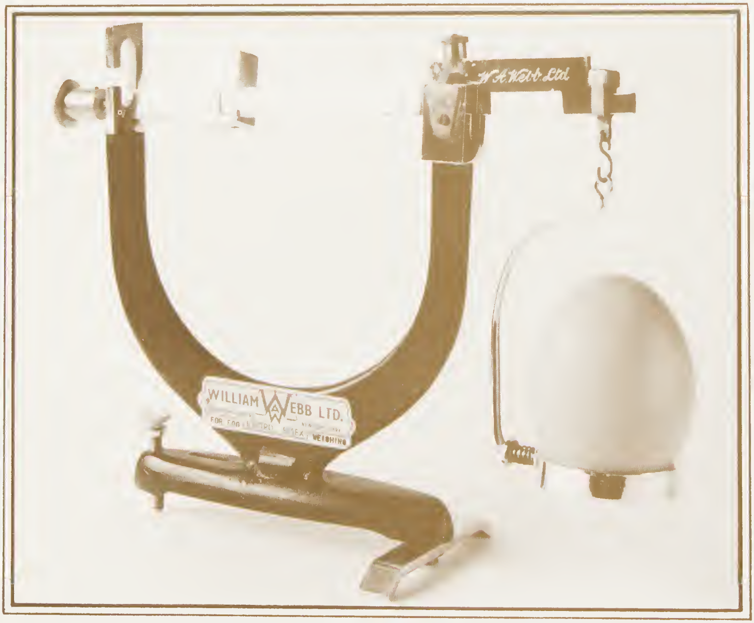
ISASC

EQUILIBRIUM

QUARTERLY MAGAZINE OF THE INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

1986-ISSUE NO. 3

PAGES 905-932



PAGE 927

Review

COVER PICTURE - see page 927.

WEIGHTS AND MEASURES IN VICTORIA

The author briefly reviews the history of the Australian weights and measures administration in the 19th and 20th centuries. He covers the standards and other equipment used; legal aspects; testing and repair of weighing and measuring instruments; sale of goods; inspection; approval patterns; units and standards; metric conversion, and many other aspects. This book will make an interesting comparison with other nations' systems and will appeal to people professionally involved in weights and measures, and to serious students of the subject. The author was Superintendent of Weights and Measures for the State of Victoria for many years, and was a member of the National Standards Commission for over twenty years.

WEIGHTS AND MEASURES ADMINISTRATION

This book is a companion volume to the book reviewed above. It deals briefly with the principles involved in weights and measures control, ancient and modern; fundamentals of measurement; consumer protection; national units and standards; weights and measures in the market place; bulk deliveries; packaged goods, standardization of packaging; public weighing and measuring instruments; several other aspect and takes a look at the future. This book will interest the same readers as the one reviewed above.

'Weights and Measures in Victoria: A History and Survey' by S.J.Proctor. 1983, ISBN 0-949620-00-9. Glossy paper-back, 82 pages, 5 black-and-white illustrations 'Weights and Measures Administration' by S.J.Proctor. 1983 ISBN 0-949620-01-7. Glossy paper-back, 107 pages, 5 black-and-white illustrations. Price of each book $6.95 within Australia, $8.00 elsewhere, in Australian currency. Available from Campion Books, 83 Franklin St, Melbourne, 3000, Victoria, Australia. Price includes postage & packing.

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Ratl Weights in Ottoman Palestine

LIONEL HOLLAND

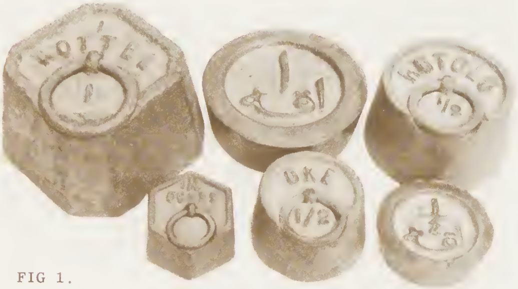


FIG 1.

Early in the 7th century A.D., the prophet Muhammed brought the message of Islam to the people of Arabia. Within 150 years of his death, his successors, the Khalifs, had established an Islamic empire extending from Spain to central Asia. Inexperienced in the techniques of imperial administration, the Arabs borrowed freely from the older civilizations whose territories they had overrun. Their system of weights and coinage were based on Romano-Byzantine models.

The main commercial unit of weight of the Arabs was the RATL (also rendered by Europeans as 'rottel', 'rotolo', etc). The word 'ratl' is a slightly scrambled Arabic rendering of 'litra', the Byzantine-Greek word for a pound. Other Arabic terms similarly borrowed, include 'dirham' (a silver coin), from 'drachma'; 'dinar' (a gold coin), from 'denarius' - originally the name of a Roman silver coin, but in the common parlance of the Byzantine empire, used for gold coins also; 'wuqiyyah', from 'oungia' (Latin: uncia), an ounce etc.

Unlike the Romans, who used a single, all purpose system of weights, the Arabs developed separate systems for coinage and for merchandise. Gold and silver were weighed in multiples and fractions of special units, called 'mithqal' (for gold) and 'dirham (for silver) respectively. The 'ratl' of twelve 'wuqiyyah' served for weighing goods.

'Ratl' is not the name of one particular defined unit of mass. It is a generic term (like 'pound' or 'mark' in Europe), applicable to any one of many local or regional units, each of different mass. The 19th-century scholar, Henri Sauvaire compiled, from Arabic literary and historical sources, a list of no less than 165 different ratls in use at one time or another, in the Islamic world (1).

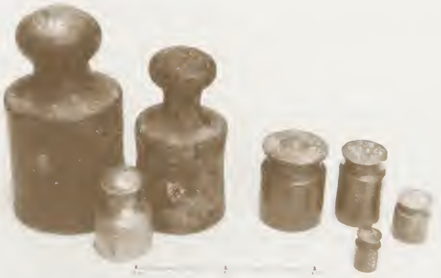


FIG 2.

We know little about the true mass of most of these units; most of the published figures are open to question. What little knowledge we do have, supported by experimental evidence, is mostly about Egypt between the 7th and 15th centuries A.D. From that time, until the end of the 18th century, we know almost nothing concerning Islamic weight standards.

Napoleon's invasion of Egypt in 1797 shook the Near East out of the Middle Ages and into the modern world. A growing stream of European visitors began to arrive, many of them bound for Palestine and the holy places of Christianity. The guide books provided by Baedeker, John Murray, Thomas Cook & Sons, and others, to help tourists find their way about this exotic and bewildering region, have become an invaluable source of information about local conditions at that time. Almost all such guide books have a section on weights and measures, with conversion tables into European units.

Surviving weights from this period are more plentiful than those from previous centuries. Until the 19th century, most commercial weights in the Middle East seem to have been made from brass or bronze (though in the early Arab empire, glass was used; and under the Fatimids in Egypt, lead as well). All too often, they were eventually melted down - possibly for making cannon. The European newcomers introduced weights of cast iron, adjusted with a lead plug. The use of lead weights became more widespread, too, particularly among the Jewish farmers who arrived in Palestine from Eastern Europe in increasing numbers as the 19th century wore on. Some Europeans, unable or unwilling to adjust to local practices, brought their own weights with them: Attractive specimens of European metric and non-metric weights are still to be found in Israel antique shops and flea markets.

At the end of World War I, the Ottoman Empire - of which Palestine had been a part since 1517 - was dismantled, and Palestine acquired a British Administration under the league of Nations mandate. The Mandatory government tried to introduce the metric system into Palestine, but was only partly successful. By 1947, the metric system had been made compulsory for all public business, but British Imperial or traditional local units of measurement could still legally be used in private transactions. In 1948, the sovereign State of Israel came into being, and the metric system was adopted to the exclusion of all others.

In Ottoman Palestine, there were at least two, possibly three, varieties of ratl in use. Coordinated with these in the overall system were other traditional units, of which the most important was the dirham. Originally, an Arabic silver coin (until about the 14th century A.D.), the dirham finally evolved into a unit of weight used throughout most of the Islamic world. In the Eastern territories of the Ottoman Empire, it had a mass of 3.2g. In the last century, the government of Turkey standardized the dirham at 3.205g, and the British in Palestine followed suit; but this is a modern refinement). In Egypt, the mass of the dirham was slightly less - about 3.1g. Larger units of weight would be defined in terms of the dirham: for example, the Northern Palestine ratl weighed 800 dirhams, the Southern ratl 900 dirhams, etc. Four hundred dirhams made one Okka (also Oqqa, Oke, Ocque, etc). The Okka was originally a purely Turkish unit, used throughout the Ottoman Empire. It is sufficiently interesting to merit an article on its own.

The units of weight current in Ottoman Palestine are summarized in Table 1:

WEIGHT STANDARDS IN OTTOMAN PALESTINE

	NORTHERN	SOUTHERN
1 dirham	3.2 grams	3.2 grams
1 okka (400 dirhams)	1280.0 grams	1280.0 grams
1 wuqiyyah	213.3 grams	240.0 grams
1 ratl (12 wuqiyyeh)	2560.0 g (800 dirhams)	2880.0 g (900 dirhams)
1 qantar (100 ratls)	256.0 kilograms	288.0 kilograms

TABLE 1.

The word 'qantar' (or kantar') is the Arabic version of the Latin name 'centenarius', a hundredweight (the word 'quintal', used in France and Spain, is derived from the Arabic 'qantar').

The lighter Northern ratl was used in Haifa, 'Akko' (Acre), and in Upper and lower Galilee. It is identical with the ratl used in Lebanon and Syria during the 19th and 20th centuries. The Southern ratl was used in Jaffa, Samaria, and Jerusalem (2). Around my home town, Hadera, which lies by the sea just half-way between Haifa and Tel Aviv-Jaffa, I have come across evidence that different standards were in use in communities within a few kilometres of each other. Thus, one can make an educated guess at the location of a probable dividing line between the two standards (see map on p. 912).

The Government of Palestine Weights and Measures Ordinance (1947) also mentions a 'Hebron ratl' of 1000 dirhams (3.2kg). I have not, so far, encountered any specimens of this standard.

All these different ratls must have led to some confusion and uncertainty, especially since there was nothing in the appearance of the weights to identify them with one standard or another. A friend of mine, whose father was a grocer in Nazareth about fifty years ago, recalls customers buying olives, and being told the price, asking "Is this the price for a 'Ratl-al-Jalil' or for the Ratl-al-Naulsi ?" (i.e. the Galilee 'Northern Ratl' or for the Nablus 'Southern Ratl'). There must have been plenty of room for fraudulent practice. I have found a number of weights on the Northern standards, in Jaffa antique shops - but never a single specimen of the heavier Southern standard, anywhere in the North.

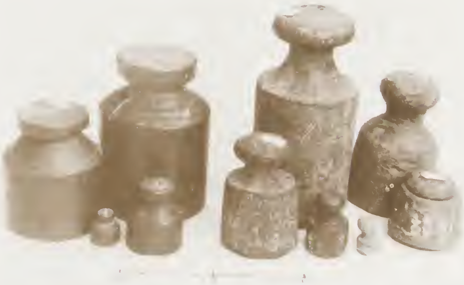


FIG 3.

In Fig 2 we can see, on the left, cast brass weights of the Ottoman period. They are stamped on the side with a verification mark: the Arabic word 'baladi' (municipality). The largest (one ratl) weight is stamped on the knob with the Arabic number '12', (see page 912).

The machine-turned brass or bronze weights on the right of Fig 2, are from the British Mandate period. They bear various stamps of the 1930s and 40s, and the Hebrew initials 'ayin-tav-aleph', standing for 'Municipality of Tel-Aviv'. They are also marked with the Hebrew letter 'mem' inside a circle - the trade-mark of the manufacturer, the firm (no longer extant) of Melamed, in Jerusalem.

Fig 1 shows various forms of iron weights. On the ring-weights, the ring (welded into a single piece) passes through the head of a split-pin, the legs of which go through a hole in the top of the weight. The hole expands into a pyramidal cavity on the underside. The lead which is poured into this cavity to adjust the weight, fixes the pin permanently in place and is also prevented by it from falling out. The ring, when not in use, fits snugly into a recess in the top of the weight. This is an invariable feature of all the ratl and okka ring weights I have seen, so far - admittedly not many ! Several of my ring-weights are stamped on the lead plug with the initials 'T.F.', probably a European manufacturer's mark (can any reader help with identification ?).

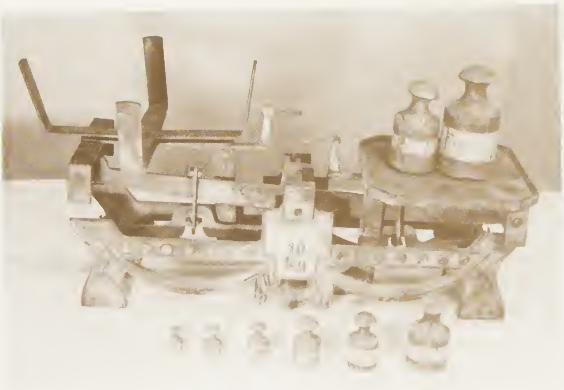


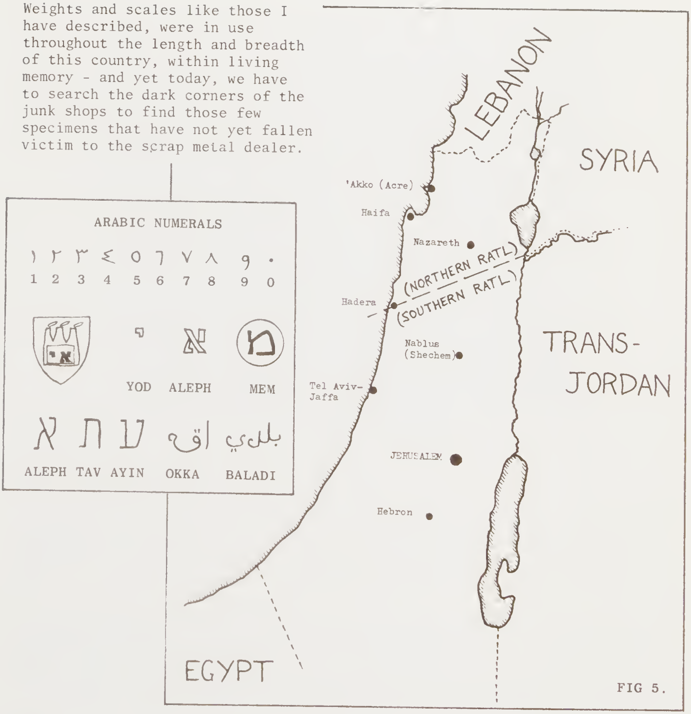
FIG 4.

Not all the iron weights shown here are ratl weights. Besides the specimens marked ½ OKE and ¼ OCKES, the two stacking weights are marked 1 OKKA and ¼ OKKA in Arabic. They weigh 1249 and 312 grams, respectively, indicating that they are made to the Egyptian standard. They are included here to show as many as possible of the forms of weights used in this part of the world.

In Fig 3 we can see two kinds of lead weight. Those on the left are factory-made. They are stamped with the aforementioned Melamed trade-mark, and with another mark which I have not, so far, identified: a shield bearing three stylised factory chimneys and the Hebrew letters 'aleph-yod'. These are the initials of 'Eretz-Israel' - 'Land of Israel' - part of the official Hebrew title of Palestine during the Mandatory period.

The weights on the right of Fig 3 are the rough products of a backyard foundry. They were used by farmers all over the country, and are the most commonly found of all types of weight described here. The variablity of their mass testifies to their having been made and used with very little official supervision. Nevertheless, some of them carry a denomination and one or more date-stamps (from the 1920s through the 40s), and the initials of the municipalities of Tel-Aviv or Petah Tikvah.

Many of these weights are not made of pure lead. With (presumably) economy in mind, the founder packed the mould with pieces of scrap iron before pouring in the molten lead. If, as often happened, any iron remained exposed on the surface, it would eventually rust, expanding in the process and sometimes bursting the body of the weight. This can be clearly seen on the half-ratl weight in Fig 4 . This set was found under a pile of rubbish in a farmer's shed near Hadera, together with the handsome counter scale. The scale was verified in Bonn, Germany, in 1922 (3). It is stamped with the single letter 'M' on the beam below the pivot (can any reader help to identify the maker ?) ▷



Weights and scales like those I have described, were in use throughout the length and breadth of this country, within living memory - and yet today, we have to search the dark corners of the junk shops to find those few specimens that have not yet fallen victim to the scrap metal dealer.

FIG 5.

NOTES

1. HINZ. W. 'Islamische Masse und Gewichte' Leyden, 1955, p.28. Sauvere's researches were published in the 'Journal Asiatique' between 1879 and 1887, and are not easily accessible.
2. I think it probable that this ratl was also used in Trans-Jordan (today the Hashemite Kingdom of Jordan). It is difficult for me to obtain information about this, and I would appreciate any help readers can give.
3. I am indebted to Mr.Norbert Schwermann for an explanation of the German verification marks.

English Coin-Weights 2

NORMAN BIGGS

OVERVIEW

The production of coin-weights in England did not follow a uniform pattern - quite the opposite. It is possible to identify five periods during which coin-weights were made, each one (except the last) being followed by a break of several decades before new demands led to renewed production. Sherlock Holmes made a famous remark about 'the curious incident of the dog in the night-time' to the effect that the reason why the dog did not bark was just as interesting as if it had barked. The same is true here: the breaks in the production of coin-weights tell us just as much about their function as do the periods of manufacture.

THE LATE MEDIEVAL PERIOD (about 1421 - 1526)

The first series of gold coins to circulate widely in England were known as nobles, and valued at 6s 8d. In 1412, the weight of a noble was reduced to 108 grains, and in 1421 a Statute (9 Henry V st.2 c.7) authorized the production of coin-weights for nobles, half-nobles and quarter-nobles. These are the earliest English coin-weights for which a firm identification exists. They are round and stamped on one side with a crown and a fleur-de-lis (Fig 1.). Their purpose was probably to discourage clipping and counterfeiting, and thereby facilitate trade which ultimately benefitted the Exchequer.

In 1465, Edward IV introduced a new series of coins; the ryal (or rose noble) of 120 grains, valued at 10 shillings, and the angel of 80 grains valued at 6 shillings and 8 pence. Weights for these coins, and for the old nobles (which still circulated) are rare, but not excessively so, Figs 2, 3, & 4. They are circular and slightly more elaborate than the 1421 type, being stamped with a crude representation of the coin for which they were intended, The date of such weights is something of a puzzle and it will be discussed more fully in the third of these articles. It is probably safe to say that they were manufactured in the years around 1495 - 1525, although some of them may have been produced before that. During that period, there was a general growth in trade, and confidence in the gold coinage was being established. However, in 1526, Henry VIII began his 'experiments' with the coinage, in which he decreased the gold content while maintaining the official valuation. Thus ended the first period of production of coin-weights in England. A monarch intent on defrauding his subjects by debasing the coinage does not encourage them to take an interest in the weight of their coins, and indeed, we find no evidence for the production of coin-weights throughout the rest of his reign.

THE JACOBEAN PERIOD (about 1587 - 1646)

Elizabeth I finally restored the integrity of the coinage so abused by her father. A natural consequence was a proclamation in 1587 in which the people were exhorted to use scales and weights provided by the Royal Mint, to check the multitude of different coins then in circulation. These extremely rare weights were of a new type, being square and with a design on both sides. They bear the queen's bust, or the obverse of the relevant coin, in a beaded circle on the obverse, and a crown over the value on the reverse, Fig 5.

James I issued several new series of coins, and correspondingly we find many coin-weights of the same general type as those of Elizabeth, Fig 6. Some of the coins were of fine gold and some were of crown gold, so it is likely that one reason for the use of weights at this time was to avoid confusion caused by the circulation of many coins with two different standards. But the weights themselves were many and various, and caused yet more confusion, so that in 1632, Charles I prohibited the use of square weights altogether. In their place he issued a new group of round weights, finely designed by Nicholas Briot, Figs 7 & 8. These weights were very widely used, as may be concluded from their relative abundance to this day. Slightly later, there appeared a separate group of round brass weights, probably made unofficially, for the silver coins, Fig 9. The reasons for the existence of this group have never been adequately explained.

The Jacobean period ended with the chaos of the Civil War. People who had gold coins tended to hide them rather than trade with them, and the niceties of exchange were forgotten.

THE NEWTONIAN PERIOD (about 1684 - 1710)

Soon after the restoration of the monarchy, Charles II issued a new type of gold coin, which came to be known as a guinea. The guineas were milled (that is, made by machine) and the need for weighing them as a precaution against clipping did not immediately arise. However, much of the old hammered coinage returned to circulation, and although Briot's weights were still in use there was some demand for new weights for the old coins. Several types of weights of this kind were produced in the reign of James II (1685 - 1688); they bear the king's head on the obverse and the value under a crown on the reverse, Fig 10. Although the milled guineas could not be clipped, there were noticeable variations in their weight, caused by poor workmanship or wear. Thus, it was possible to make a profit by passing light coins and by melting heavy ones. Such practices contributed to the emergence of a new group of weights for the guineas (and for French pistoles, which were beginning to circulate in England). These weights began to appear in the reign of William and Mary (1698 - 1694), Fig 11. They continued to be made in large numbers during the reign of William alone (1694 - 1702) Figs 12 & 13, and in smaller numbers in the reign of Anne (1702 - 1714). There is also a small group of simple weights for silver coins, Fig 14, possibly connected with the great Recoinage of 1696 - 1697, when the old and badly mutilated silver coin was melted down and recoined.

It was the work of Isaac Newton as Warden and Master of the Mint, which led directly to the end of this period of coin-weight production, for he took great interest in the fine details of currency and exchange, making extensive tables and calculations. As a result of his work, the coinage was standardized to the point where weighing of individual coins was unnecessary.

THE EIGHTEENTH-CENTURY PERIOD (about 1740 - 1800)

In 1703, the Methuen Trade Treaty with Portugal was signed, and this led to a substantial increase in trade between the two countries. As a result, the Portuguese moidore, together with its half and quarter, began to circulate in England. Initially, it was valued at 28 shillings, reduced to 27 shillings and 6 pence in 1714, and later, to 27 shillings. The government's failure to provide sufficient well-made guineas (especially after the death of Newton) meant that the Portuguese coins eventually became very common, almost displacing the guineas entirely in some parts of the country. Sets of weights for guineas and moidores began to appear around 1740, Figs 15 & 16, and by 1746, they were joined by weights for a new series of Portuguese coins based on the so-called double johannis of £3:12s. Once again, the proliferation of coin-types in circulation led to a demand for weights, and sets of weights for no less than eleven coins were produced in large numbers during the period 1750 - 1765, Fig 17.

By about 1770, the Portuguese gold had ceased to enter the country and the government resolved to make another attempt to regulate the guinea coinage. In 1774, complex legislation was introduced setting legal limits for both old and new guineas. The practical details of this legislation meant that coin-weights once again became essential, and the years immediately following 1774 saw probably the largest production of weights ever to take place in England. Very many different designs were made corresponding to the 'old' and 'new' standards for guineas, Figs 18,19 & 20. Weights for the halves and quarters were also made, although, curiously, no new standard quarter-guineas were ever minted.

In 1797, the country's gold reserves fell to a dangerously low level as a result of the expenses of the Napoleonic wars, and for many years payments in gold were suspended, transactions being performed with Bank Notes. This meant that the weights already in existence were sufficient to meet the needs of the people, and few new weights were produced until the introduction of the Gold Standard and a completely new coinage in 1817.

THE NINETEENTH-CENTURY PERIOD (about 1821 - 1850)

The new 'sovereign' coinage of 1817 led to a renewed interest in weighing coins. The authorities were anxious that the old abuses should not return, and in 1821, the Royal Mint produced a very large number of weights for the sovereign, Fig 21, and half-sovereign, together with weights for the guinea, half-guinea and third-guinea, which were still in circulation. The 1821 sovereign weights are, perhaps, the most common single type encountered today. The success of the sovereign coinage meant that the weights gradually fell out of use, but from time to time it was thought necessary to remind people that it was still important to check their coins, and sets of weights were issued by the Mint in 1842, and again in 1843, Fig 22. There were also several types of unofficial weights produced at this time, Figs 23, 24 & 25.

However, the natural reluctance of people to spend time weighing coins soon led to an unquestioning acceptance of the gold sovereign. Only the detection of counterfeit coins remained a problem, and this could be done with a 'rocker' balance which needed no weights. Thus the story of English coin-weights ends, not with a bang, but with an apathetic whimper. But, fortunately, the weights themselves survive to provide us with a series of fascinating insights into the economic history of the country.

NOTES ON THE ILLUSTRATIONS

In each case, a brief description of the weight is given first, including its actual weight in grains, diameter in millimetres, and the approximate date of manufacture. Details of the coin for which the weight was intended, follow. The figure given for the weight of the coin is the intended average weight of new coins leaving the Mint. At certain times, a lesser figure may have been specified as the minimum acceptable for current coins. Unless stated otherwise, all coins are gold, of 91.67% fineness.

MEDIEVAL PERIOD

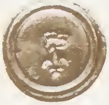
1. Obv. stamped crown and fleur-de-lis. Rev. blank. 97gr. 19mm. c.1421 For the noble from 1412, 108gr of fine gold, 6s 8d.
2. Obv: ship with fleur-de-lis and leopard. Rev: blank. 98gr. 17mm. c.1500? For the noble 1412 - 1464, 108gr of fine gold, value 9s after 1465.
3. Obv: king in ship with shield. Rev: blank. 116gr, 17mm, c.1500? For the ryal of Edward IV (1465 - 70), 120gr of fine gold, 10s.
4. Obv: angel spearing dragon. Rev: blank. 74gr, 15mm, c.1500. For the angel (1465 onwards), 80gr of fine gold, 6s 8d.

JACOBEAN PERIOD

5. Obv: angel spearing dragon. Rev: crown Xs. 78gr, 16mm, c.1590. For the angel before 1603, 80gr of fine gold, 10s.
6. Obv: bust of James I. Rev: crown, XXs stamped crown over I. 140gr, 19mm, c.1620. For the laurel of James I (1619 - 25), 140gr, 20s.
7. Obv: bust of James I, I.R. M.BRIT. Rev: crown Vs.VId. 88gr, 14mm, c.1633. For the Britain crown of James I, second coinage, (1604 - 1619), 39gr, valued at 5s 6d from 1612.
8. Obv: Thistle, I.R. Rev: crown, IIIIs 4d½ signed B (Briot). 29gr, 14mm, c.1633. For the Thistle crown of James I, second coinage (1604 - 1619), 31gr, valued at 4s 4½d from 1612.
9. Obv: crown over C, Is, TR monogram (Thomas Rawlins). Rev: crown over R, XIId, 4 fleur-de-lis. 93gr, 17mm, c.1640. For the shilling from 1601, 93 gr of silver, 1s.

NEWTONIAN PERIOD

10. Obv:bust of James II, IACUBUS.II.REX. Rev: crown, XIs (I added incuse), 76gr, 17mm, c.1685. For the half-unite of James I, Second coinage, (1604 - 19), 77gr, 11s.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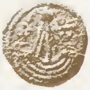
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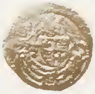
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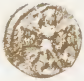
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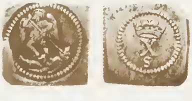

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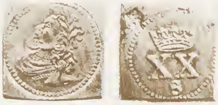

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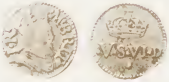
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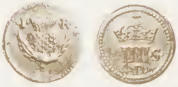
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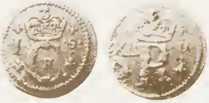
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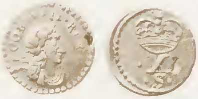
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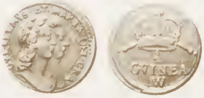

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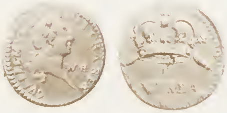
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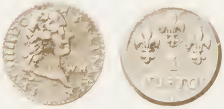

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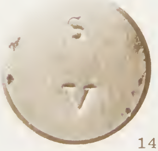

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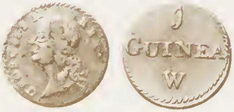

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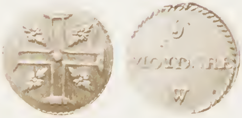

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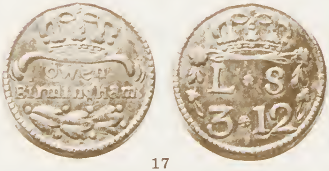

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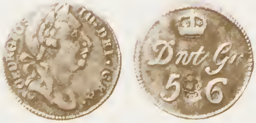

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11. Obv: busts of William & Mary, GVLIELMVS.ET.MARIA.DEI.GRA. Rev: crown with sceptres, ½ GVINEA W. 65gr, 17mm, c.1690. For the half-guinea from 1663, 65gr, valued at 10s initially, rising to 14s in the 1690s.

12. Obv: bust of William III, GULIELMUS III DEI.GRA.REX. signed WH (William Haywood). Rev: crown with sceptres, 1 GVINEA W. 128gr, 20mm, c.1700. For the guinea from 1663, 129gr, value fixed at 21s 6d in 1697.

13. Obv: bust of Louis XIV, LVD XIIII D.G FR.ET.NA.REX, signed WH (William Haywood). Rev: 3 fleur-de-lis, 1 PISTOL W. 104gr, 19mm, c.1700. For the French pistole or louis d'or (1643 onwards), 104gr, valued at 17s 6d up to 1701, then 17s thereafter.

14. Obv: S V incuse. Rev: as obv. 462gr, 27mm, c.1697. For the hammered crown, 464gr of silver, 5s.

EIGHTEENTH-CENTURY PERIOD

15. Obv. bust of George II, GEORGIUS II.REX. Rev: 1 GUINEA W. 129gr, 20mm, c.1740. For the guinea, as No.12, value reduced to 21s in 1717.

16. Obv: Portuguese cross, floral motif between. Rev: 1 MOIDORE W. 166gr, 20mm, c.1740. For the Portuguese moidore of 3 escudos, or 4800 reis, (1677 - 1733). 166gr, 27s.

17. Obv: crown, floral decoration, Owen Birmingham. Rev: crown, floral motif, L3 S12. 437gr, 28mm, c.1750. For the Portuguese double johannis of 8 escudos, (1723 - 32), 444gr, £3 12s.

18. Obv: bust of George III, GEORGIUS III.DEI.GRA. Rev: small crown, Dwt 5 Gr 6, stamped ewer (Founder's Co.) 126gr, 22mm, c.1775. For the guinea coined before 1772, mint weight 129gr, but current for 20s 6d if over 126gr.

19. Obv: COINED BEFORE 1772. Rev: Dwt.5 Gr.6. 126gr, 19mm, c.1775. For guineas, as No.18.

20. Obv: COINED SINCE 1772. Rev: crown between G R III, Dwt.5 Gr.8 stamped ewer (Founder's Co.) 128gr, 19mm, c.1775. For guineas coined from 1772 128gr, 21s.

NINETEENTH-CENTURY PERIOD

21. Obv: lion on crown, ROYAL MINT 1821. Rev: CURt WEIGHT SOVEREIGN DW 5 GR 2½. 122gr, 21mm, 1821. For the sovereign (1817 onwards). 20s.

22. Obv: bust of Queen Victoria, ROYAL MINT 1843. Rev: CURt WEIGHT SOVEREIGN DW.5 GR.2½ incuse. 122gr, 21mm, 1843. For the sovereign, as No.21.

23. Obv: rose, STANDARD. W.CHAMBERS DAY. Rev: CURt WEIGHT HALF SOVEREIGN D.2 G.13½, 1842. 61gr, 18mm, 1842. For the half-sovereign, 1817 onwards, 61gr, 10s.

24. Obv: crown, STANDARD. W.& T.AVERY. Rev: CURt. WEIGHT HALF SOVEREIGN 1842. 61gr, 18mm, 1842. For the half-sovereign, as No.23.

25. Obv: bee hive, WARRANTED CORRECT. Rev: ONE SOVEREIGN WEIGHT 1843. 122gr, 22mm, 1843. For the sovereign, as No.21.

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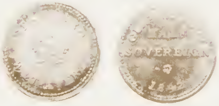
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25

Egg Scales *(3)*

MICHAEL CRAWFORTH

AUTHOR'S NOTE: *I was surprised to find that Part 1 of this series was written as long ago as 1981. However, since then, many unfamiliar designs of egg scale have been brought to my notice, and they show some fascinating ideas. I am indebted to Tod Carley, Al Eaches, Jan Macho and Bob Miller for their help in making possible the promised supplement. (Parts 1 & 2 were in EQM 1981 No.4 and 1982 No.1, pages 375 - 384 & 410 - 417).*

In Part 1, I referred to illustration No.3 (page 378 & 9), and mentioned that the extended wooden base seemed to have no apparent purpose, and the same comment might have been applied to No.7 (page 379). However, I have since been told that these long bases were to rest across an egg box, making it convenient to use the scale wherever the eggs were being handled and packed - simple, when you know the answer !

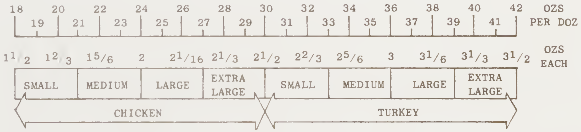
The most unusual balance is an anonymous pendulum design with a cam-and-cord arrangement, No.59. A quadrant attached to the beam has a groove around the curved edge. In this groove rests a cord, to which is attached a wire egg holder. The groove is not simply part of a circle centred on the fulcrum, but is a modified curve to give equally spaced graduations for equal increments of load. (A simple pendulum has graduations which get closer together as the load increases, making reading less accurate).

Number 63 is a combined egg and letter scale, Salter No.11T, the 'T' indicating its suitability for trade use. It is also marked "Ken More Egg Balance. Sutherland, Thompson & Co. 31 Tooley St, London S.E." who is, presumably, a supplier of poultry equipment.

Two more simple balances have been found, Nos. 53 & 61, which check only one grade. A slight elaboration of the elementary type is shown in No.58, which has a two-position weight, giving two grades - an alternative to the twin holes of No.43 (page 417). A triple beam simple rocker, called the 'Bernard Egg Grader', No.64, was marked "Smalls, Standards, Specials", and was illustrated in a catalogue of 1939.

Number 62 provides an interesting comparison with No.1 (page 379), and is, presumably, a later, cut-price version. The cast legs and pillar, and the spun aluminium cups, shown in No.1, have been replaced in No.62 by bent metal strips ingeniously shaped to give a similar appearance.

Turkey eggs are tested by No.60. It is marked "Brower MFG. CO. Quincy, ILL. USA. World's Largest Line Poultry Supplier" and is made from pressed and folded sheet metal, painted pale green. The graduations are:-


18 20 22 24 26 28 30 32 34 36 38 40 42 OZS
19 21 23 25 27 29 31 33 35 37 39 41 PER DOZ
1 1/2 1 2/3 1 5/6 2 2 1/16 2 1/3 2 1/2 2 2/3 2 5/6 3 3 1/6 3 1/3 3 1/2 OZS EACH
SMALL
MEDIUM
LARGE
EXTRA LARGE
SMALL
MEDIUM
LARGE
EXTRA LARGE
CHICKEN
TURKEY

The rectangles marked with the grades, Small, Medium, etc., are coloured alternately black and red.

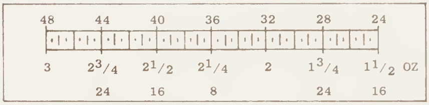
A criticism of No.7 (page 379) is that it has three different weights to be adjusted; a swing-over weight, a hang-on weight, and a ring-shaped weight to go on the egg holder. Various combinations of these weights, which are not marked, give ten weight settings (see Page 376) requiring a formidable feat of memory. Much easier to use No.51, which has three turn-over weights marked with their value, 1, 2, 4 oz, and giving eight possible combinations:-

WEIGHTS	VALUE	WEIGHTS	VALUE
all in	18 oz	4 out	22 oz
1 out	19 oz	4 & 1 out	23 oz
2 out	20 oz	4 & 2 out	24 oz
1 & 2 out	21 oz	4,1 & 2 out	25 oz

Number 55 appears to have been made by the same manufacturer as No.10 (page 381), and as such, is assumed to be an egg balance. The deep small pans are appropriately sized and could not conveniently be used for other goods, as the load pan is not removable and cannot be tipped.

A scale which might be called the 'Rolls Royce' of egg balances, has a combination of equal-arm beam with a fixed counterpoise and flat spring resistant, No.56. The finely-made gun metal beam has steel knives and agate bearings. A rod projects downwards from the centre of the beam with a 'paddle' immersed in an oil damping bath to give a rapid read-out. A long pointer indicates a range from 1½ to 2½ ounces by 1 dram, but the range can be extended to 4 ounces by adding an extra counterpoise. This balance stands 300mm (12") high and is sturdily housed in a cast aluminium casing with glass windows. Although expensively made, it must have given many years of accurate service. The maker was W.& T.Avery, of Birmingham.

Another well-made and accurate scale is shown in Fig 7, with its cover removed (also shown complete in No.36 page 415). The beam is suspended from a bracket at the top of the case, and a paddle arm decends into an oil bath damper fixed to the back of the case. A levelling screw and spirit level enable the instrument to be set up accurately. The finess of the graduations suggest that the instrument was for research purposes, rather than for commercial sales :-



Only the centre scale is marked with the units of weight, 1½ - 3 oz, but the top scale is in drams, 24 - 48, while the bottom scale divides the ounce into half-drams ! This balance is called the "Summit - Hanning Egg Weigher. Cope & Cope Ltd., Reading, England" and was patented in 1932.

You will notice the predominance of American and English egg scales in all parts of this article. If other nationalities could add to our knowledge of egg weighing I would be very grateful. Please send photographs, catalogue illustrations etc. to the Editor.

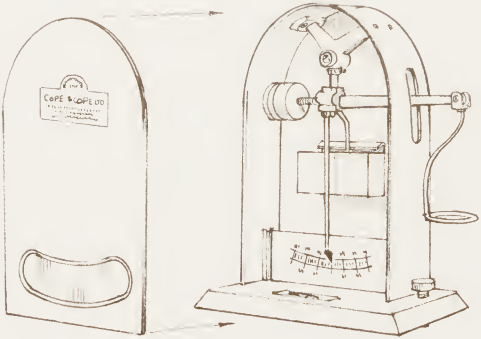
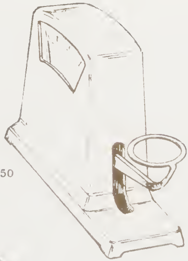


FIG 7. Summit - Hanning Egg Weigher by Cope & Cope Ltd, Reading. Patented in 1932.



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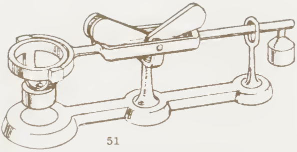

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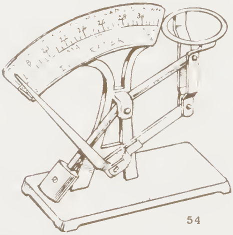

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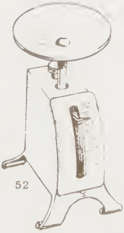

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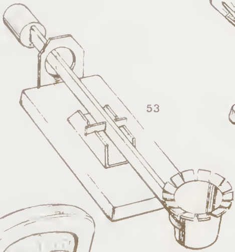

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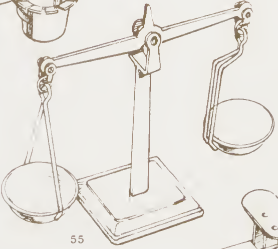

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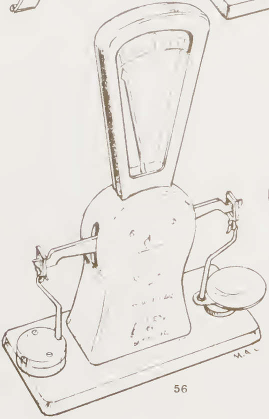

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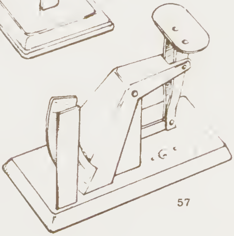


57

KEY TO THE ILLUSTRATIONS

50. Mascot Egg Grader. Prospectus MFG Co. Minneapolis, Min. American. 18 - 30oz per doz. 1½ - 2½oz per egg. unpainted aluminium. see No.54.

51. White Manufacturing Co. Gardena, California. American. Cast iron with an overall length of 230mm (9"). The fixed weight is marked 18oz, and the turn-over weights are 1,2 & 4oz. Range 18 to 25 oz per doz.

52. Salter No.18E. English. This is the rare early bow-front design with scroll feet which was superseded in the late 1920s. 0 - 4oz x ¼oz, no grades. Copper-bronze finish. Height 100mm (4").

53. Unsigned. American. Galvanised sheet metal. A single weight setting, not marked but appears to be 21 oz per doz. Rocker type, length 310mm (12¼").

54. Mascot Egg Grader, Prospectus MFG Co. Minneapolis, Minn. American. 16 - 32 oz per dozen. see No.50.

55. Unsigned. English. This design almost certainly for egg weighing - compare with No.10 (p.381) which was patented by J.Hunt in 1933.

56. Avery. English. Equal-arm with fixed counter-poise, spring resistant and oil damper. 1½ - 2½ oz x 1 dram, and marked "For Egg Weighing Only" An extra weight may be added to increase capacity to 4 oz.

57. Brower Egg Scale. American. 18 - 30 oz per doz. 70 - 130 points, 1½ - 2½ oz per egg. Swivel stop for 22 & 24 oz per doz. (not shown). A small steel ball in a cup below a plastic window serves as a level.

58. Unsigned. American. Folded sheet metal. Sliding weight has two positions for two grades. Rocker type with accurate location for the egg.

59. Unsigned. English. Cam-and-cord type of pendulum, or inclination balance. Equally-spaced graduations 0 - 4oz. Painted dark blue, marked Egg Grader.

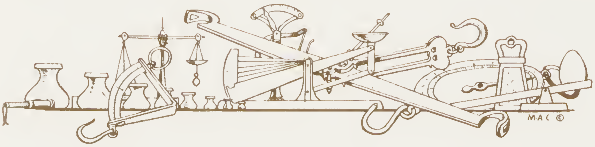
60. Brower, Quincy, Illinois. Egg scale for chicken and turkey eggs 18 - 42 oz per dozen. 1½ - 3½ oz per egg; Chicken Small, Medium, Large, Extra-Large; Turkey Small, Large, Extra-Large.

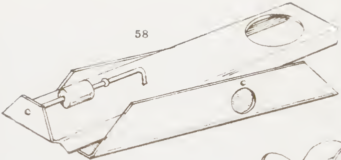
61. Royal. American. fixed value 23 oz. Clear varnished sheet metal.

62. Unsigned. English. Roberval type with weights 2,1,½,¼,and 1/8 oz. Bent metal strips replace the earlier (?) cast iron see No.1 (p.379).

63. Salter No.11T. English. 0 - 8oz x 1 dram. Pullet 1½oz, Medium 1 3/4oz, Standard 2oz, Special 2¼oz. Marked by retailer (see text). Plate for eggs and letters. Black crackle finish. White enamelled face.

64. Bernard Egg Grader. English. Marked Smalls, Standards, Specials. Shown in the JaCeM catalogue, 1939. Price 2s 6d. No.47e.





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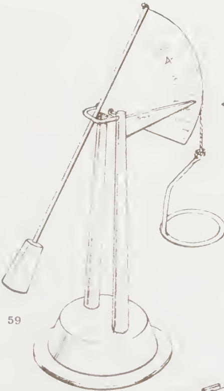

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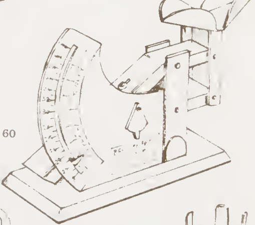

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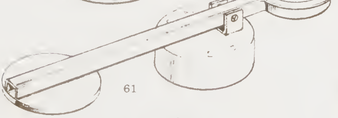

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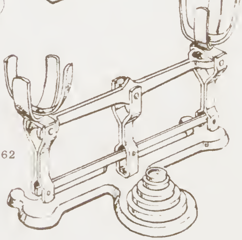

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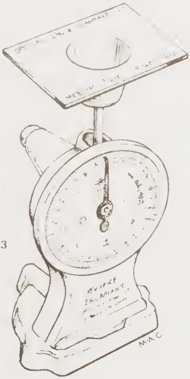

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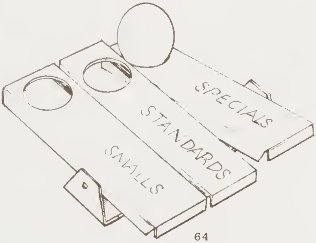


64

Notes & Queries

NQ 86 RED BEANS

query from Michael Crawforth

I have some little red beans each with a black spot, weighing 0.106g dry. These were said to be carob beans used as 'carat' weights. Can anyone verify this statement ?

REPLY

from Dr.A. Lieber

Your beans are Gunja or Ratte beans (Abrus Brecatorius) grown in India and Malaysia, and used there to weigh pearls and precious stones, as the equivalent of the carat further West. The ratte bean weighed 0.11g to 0.18g or about 2/3 of a carat. The carob is a plain flattish brown bean.

NQ 87 SALTER ALBION

query from T.J.W.Smith

I 'phoned Salters in Birmingham last week, and they suggested I should contact you. I have an old weighing machine which has been in the family for some years, and I am curious to know how old it is. The machine is a Salter 'Albion' No.214, to weigh 20 stone by 1 lb. Do you know anything about this machine ?

REPLY

from the Editor

The 'Albion' personal weighing machine, No.214, was illustrated in the 1912 catalogue of Geo. Salter & Co. It was described as "Most suitable for use of medical men, bath rooms Etc Occupying smallest possible space" "Height 5ft 8in, width 1 ft. Depth 1 ft 10in. To weigh 20 stone x 1 lb, with 10 inch White Enamelled Dial, Nickel-plated Rim and glass Cover, Pillar and Base finished White Enamelled, and Stand Covered with Linoleum. Price 80/- each."

The same model was still being offered in Salter's 1955 catalogue, where it was described as "Used extensively in Hospital, Clinic, Gymnasium, etc." It could be supplied with the dial facing the platform or facing an observer standing behind the machine. Model No.214S was also available with a height measuring attachment to measure up to 6 ft 6 ins.

If requested, the machine could also be supplied with a lead plug for stamping in compliance with local bye-laws governing personal weighers.

No. 214.

NQ 88 CHINESE DO'TCHIN

query from Maurice Stevenson

I have a fairly modern do'tchin in a violin-shaped case, with three sets of graduations and three silk suspension cords. So far, I have not succeeded in discovering how it should be used, as it only balances when unloaded with the poise at one of the zero graduations. My main query, however, is on the larger 'market' type of do'tchin of which I have a broken specimen with the poise weight missing. The end of the ivory beam is broken off, but I would like to make a new poise modelled on the style of my smaller one, so I am wondering if you can enlighten me on the weight series used on the smaller and larger versions of the do'tchin ?

REPLY

from the Editor

There seems to be very little published material on the do'tchin and the weight series used. Some information was given by Guus Thürkôw in an early issue of Equilibrium (pp.55-58) where he described one particular example, giving the following values:-

Scale for the foremost fulcrum: 0 - 75 fuen
Scale for the middle fulcrum: 5 - 22 tsien
Scale for the hindmost fulcrum: in liang

1 fuen = 0.3778g
1 li = 1/10 fuen
1 tsien= 3.778g
1 liang= 37.78g

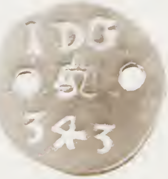
Comprehensive information on Japanese steelyards was given by Dr.Shigeo Iwata in Equilibrium (pp.319-326). Can anyone help Maurice Stevenson with information about Chinese do'tchins and their weights series ?

NQ 89 BRONZE MYSTERY

query from Dietmar Doerr

I am sending you a photograph of a very mysterious thing which I got near Nuremberg. It weighs two grams and is made of bronze. The back is plain. Maybe it is a mark from a wooden rule of former times? Maybe it was a maker's mark on a scale ? I don't know, so if you know more about it, let me know please.

Can any member help Dietmar Doerr ?



NQ 90 WEIGHTS FOR LIGHT GOLD COIN

query from Gary Batz

In Holland, I saw a set of obviously English weights which struck me as odd by their great degree of pretended accuracy. The larger of the weights (they are for the sovereign and its half) was marked around the edge 'LIGHT GOLD COINS ACT', and inside the circle GRS. 119.27447. In other words, here we have accuracy to the 1/100,000th of a grain ! The other was marked LIGHT GOLD COINS ACT and inside, GRS. 57.63725. Each weight is hand engraved by a skilled engraver. The half, it seems, is not half of the indicated mass of the larger weight.

On a closer review of the data I have on the legal mass of a sovereign of 1816 (and subsequent years, right up to the present date) I discovered that 119.27447 is the result, diminished by 4 grains, of dividing the pound Troy by the amount of 'crown gold' of 22 carat sovereigns in a troy pound according to the law of 1816. Thus 5760 ÷ 46.27447 = 123.27447. The result, less 4 grains, produces the amount in the inscription on the weight. Dividing the result by two (for the half sovereign mass) I get 61.63724. Taking away another 4 grains as tolerance allowance, gives the resulting mass shown on the smaller weight.

Does anyone know the Act which would provide for such a generous allowance for wear and tear ?

REPLY from the Editor

I, too, saw these extraordinary weights in Holland. I expect the legislation referred to is 'The Coinage Act' of 1889, which enabled various Orders in Council to be made whereby the Mint redeemed at full face value, up to March 1890, all pre-Victorian sovereigns and half-sovereigns which were not more than 4 grains underweight. The high tolerance was permitted because the coins were, by then, over 50 years old. These weights must be very rare, indeed.

NQ 91 FRACTIONAL AVOIR WEIGHTS query from Gary Batz

Recently, I examined two weights that had rather curious units of weight. Their shape was like this; (see fig). The bottom was recessed beginning about 2mm from the edge, and the larger one was stamped on the shoulder 583.3 GRS. TB 1/12 LB. The smaller one was marked in the same manner and place, 500 GRS. TB 1/14 LB. They were each stamped with a Canadian verification mark GR which can be attributed to George V, from what is known (little) about Canadian marks.

The questions I have are these. What sort of weights are they ? They are obviously in grains, there being 7000 grains to the commercial pound. Why designate something in 1/12 and 1/14th of a pound avoir ? If they were used in a laboratory, why would they have to be stamped by a sealer ? What is TB, or who is TB ? Most weights in use in Canada are made in England or America, but these appear to be English.

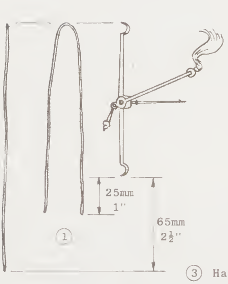
Can any member help Gary Batz ? Editor.

COVER PICTURE

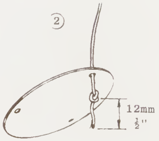
This steelyard egg scale is marked "William A.Webb Ltd. Perrymans Farm Rd. Newbury Park, Ilford, Essex. FOR EGG WEIGHING" It is made with chromium-plated beam and hanger, and has a cast iron stand. A spirit level and levelling screw allow it to be set up accurately, and the beam is set at an angle so the graduations face the observer. The feet and the egg holder fold flat, and the beam is dismantled, to fit inside a flat mahogany carrying case. A 2oz test weight is provided, and the verification mark is for 1955.

REPLACING CORDS ON ENGLISH MONEY SCALES

Obtain cord of the same colour and construction as the original. Most cords were dark green with green or gold coloured binding.

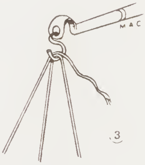


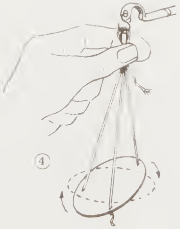
① Cut a ∩ and | of cord longer than the length of the beam to allow for knots and the binding.



② Thread the cords through each hole in the pan and tie a single tight knot near the end. If a single knot pulls through the hole the cord is too thin. Obtain thicker cord.

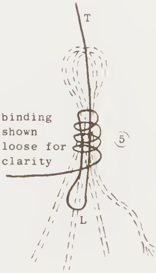
③ Hang the ∩ over the opened S ring on the beam end, and lay the single cord beside it.

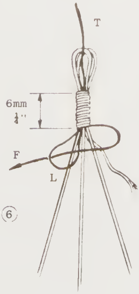




④ Bring all the cords together below the S ring and adjust the length by pulling the cords through the ring until the pan is level.

⑤ Hold the cords tightly and place a loop of thin cotton L along the place where the cords are to be bound. Bind firmly but not too tightly, from the top down towards the loop. Let the loop L and the tail T project from the binding. The cords must be taut whilst binding.

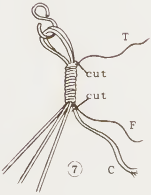




⑥ Put the free end of the cotton F completely through the loop and pull the tail T steadily and firmly. This will pull F under the binding to give a concealed fixing for both ends of the cotton binding.

⑦ Cut off the spare ends of the cotton and the spare cord, close to the binding. Cut off the spare ends from the knots below the pans.

THE REPLACEMENT IS NOW COMPLETE.



Letters

APOTHECARY'S SCALES AND WEIGHTS

With reference to the recent series on apothecary's scales and weights, many years ago I was given one of my first scales by a chemist who was retiring and selling up. It is a Beranger with a marble top, inlaid wood box, and a circular viewing window for the two pointers. The brass pans are marked faintly with VR stamps, but the scale is undoubtedly of French origin as inside the window is the legend 'Portee 1 Kilog'. Along with the scale was a set of five troy weights, flat round brass, 6,3,2,1 and ½ oz. They are of some age by their appearance and each has been adjusted by the addition of solder to the base, now worn smooth. Consequently, there are no discernable stamps. The scale and weights were kept in the rear of the shop and there is no doubt that they must have been used frequently, probably for checking stock. During my inspecting days, I also occasionally came across sets of Continental cup weights of the Loth series, in use as apothecary or troy weights by both chemists and jewellers. My reason for mentioning this is to show that apothecaries, in the South of England at least, did use apothecary weights above ¼ oz and my vague recollection is that some or all of their basic ingredients were bought-in by the apoth. (troy) ounce.

Maurice Stevenson.

REPLY

It is nice to have reinforcement of the evidence supplied by Geoffrey Newall (Letters EQM p.893). It seems that in the 20th century, some troy/apoth weights above a quarter-ounce WERE used by chemists. Of course, the author I quoted was writing about his own period, the mid 19th century, and the scarcity of surviving apothecary weights over a quarter-ounce, compared with those of lower denominations, suggests that he was substantially correct. However, the evidence may not be as overwhelming as it seems at a first glance, because of the strong probability that the majority of surviving 'apothecary' weights were actually sold for use in the home where the larger denominations were not required.

In my article, I referred to the continued use of apothecary weights in spite of their prohibition by the 1858 Medical Act. This was facilitated by the Act of 1853 which made the grain and its multiples a part of the Avoirdupois system, instead of the Troy system. Thus, the Standards Commission of 1869 was obliged to report *"...that many medical men still continue to use in their prescriptions the dram and the scruple; and that the old weights of these denominations are still much used by chemists, who consider that they conform to the regulations of the Pharmocopoeia, by terming them 60 grain and 20 grain weights."* It seems that man's ingenuity to 'get round' regulations is always greater than his ingenuity in forming the regulations !

Michael Crawforth.

American Patent CCDs

A SERIES ON COUNTERFEIT COIN DETECTORS

GEORGE MALLIS

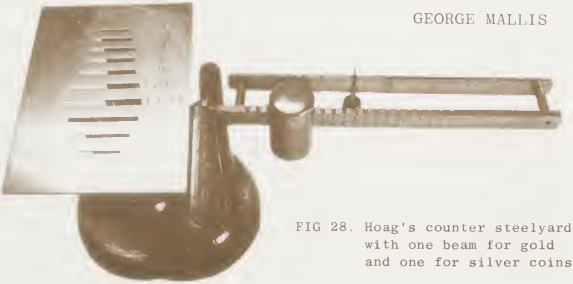


FIG 28. Hoag's counter steelyard with one beam for gold and one for silver coins.

Field's device consisted of a box divided into ten compartments to test ten different coins. Each compartment had a slot gauge at the top with a counter-weighted beam below. A coin of proper thickness and diameter passed through the slot. If it was genuine, its weight was enough to tip the beam and allow the coin to roll into the correct compartment.

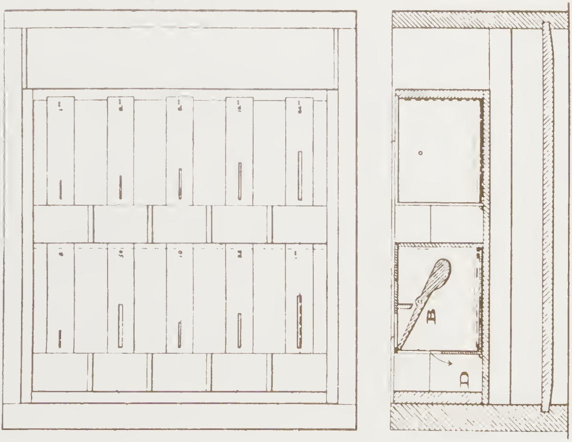
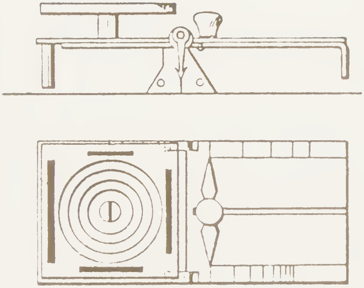


FIG 29. Patent No.203719 14 May 1878 S.A.Field. A genuine coin tilts rocker beam 'B' and rolls into storage compartment 'D'.



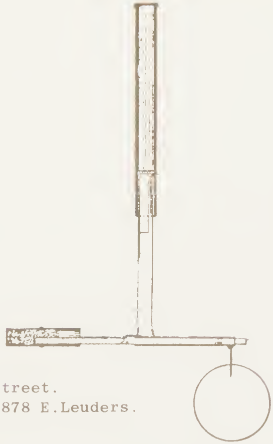


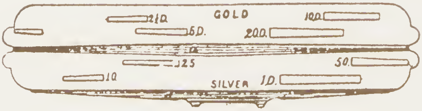
FIG 30. Patent No.209145 22 Oct 1878 E.Street.
FIG 31. (Right) Patent No.205492 2 Jul 1878 E.Leuders.

Leuder's Coin Tester was a small folding pocket scale shaped like a pen. The weighing beam, when not in use, folded into the scale case. When used, the beam was pulled out of its case and turned through 90° where it hung from a sliding fulcrum. The beam was counterweighted at one end, and a coin clip was suspended from the other end. The location of the fulcrum was set for each coin to be tested, working on the bismar principle. Strictly speaking, this device was not a CCD as only the weight of a coin was checked, and no provision was made to check either thickness or diameter.

A very effective CCD was patented by E. Street. It consisted of a balance beam with a square raised plate at one end and a sliding counterweight, in a slot, at the other end. The raised plate had marked on it a series of concentric circles, each circle corresponding to a given coin. Also on the plate were four slots for checking the thickness and diameter of the coins. The sliding counterweight was set to the relevant coin for checking the weight, and a pointer at one end of the fulcrum pin gave an accurate indication of equilibrium.

Thompson's third patent was for a plate of sheet metal with its sides bent down and shaped to form two fulcrum points. A raised rib down the centre stiffened the plate and divided it into two sections, one side to check gold and the other to silver. On each side of the rib was a series of slots, each of which is parallel for about 1/3 of its length and then increases to form a tapered slot. The size of the coin was thus tested by the size of the slot. A genuine coin placed in the proper slot caused the plate to tilt, indicating full weight.

FIG 32. Patent No.224807 24 May 1880 J.A.Thompson. Note the tapered slots - a feature yet to be explained.



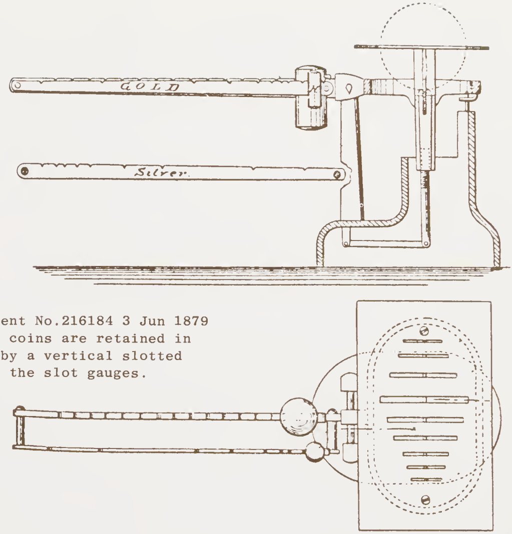


FIG 33. Patent No.216184 3 Jun 1879 G.Hoag. The coins are retained in their slot by a vertical slotted plate below the slot gauges.

G. Hoag patented a sophisticated scale having a slotted plate at one end supported by a half-roberval linkage. At the other end were two parallel beams, each with its own sliding weight. The whole mechanism was set on a cast iron base. The slots in the plate corresponded in width and length to the thickness and diameter of the coin being checked. The beam with the larger weight was for checking silver coins, while the smaller weight was for gold coins.

Old Advert

THE ELTEX "ROYSTON" EGG WEIGHER

A very efficient Egg Weigher, fitted with adjusting screw.

Height:—5 ins.

Finish: —New wrinkle-black and aluminium, with white dial

Graduated 4 ozs. × $\frac{1}{8}$ oz.

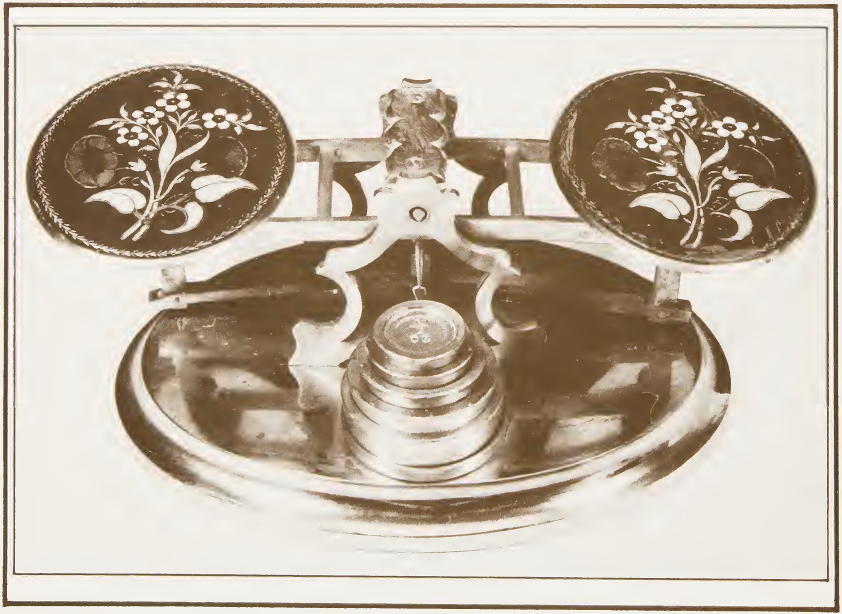
No. 606 EGG WEIGHER

ISASC

EQUILIBRIUM®

QUARTERLY MAGAZINE OF THE INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

1986-ISSUE NO. 4 **10TH ANNIVERSARY ISSUE** PAGES 933-964



ISASC - 10th Anniversary

ISASC was formed ten years ago this Autumn, bringing together the collector-friends of Bob Stein and myself - a grand total of twenty-five. Since then, our Society has been growing and maturing, influenced by many specialized collectors from many nations. Without our Society we would never have known people who collect only laboratory scales, only coin weights, specialize in spring balances, in coin-in-the-slot scales, nesting weights, trade scales, collect only one country's scales and weights..... Through their enthusiasms we have all learnt many new ways of looking at a collection. Whichever aspect is studied, it always reveals greater depth and deeper satisfaction than expected. If your delights have not yet been illustrated in Equilibrium, be patient, we have more authors lined up for the next ten years, and many subjects being studied on your behalf.

To celebrate our Tenth Anniversary, this issue of Equilibrium contains full-colour illustrations of superb scales and weights, showing the decorative imagination of S.Mordan & Co's products and a variety of attractive items in Colour Showcase.

May our next ten years be as fruitful and rewarding as the first.

Michael Crawforth.

COVER PICTURE

This postal scale, stamped TRUSSELL, BRIGHTON, was made by S.Mordan & Co. (technical reasons being given in the article, p.935), but the decoration is unusual. Vivid enamels are high-lighted by cloisonné bands with bright convolvulous and little white flowers. This expensive scale would have sold readily in the upper-class holiday town of Brighton in the 19th C.

Photo: courtesy Lou uit den Boogaard.

INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

Founded September, 1976

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Associate Editor — Diana Crawforth

2 Field Close, Yarnton
Oxford OX5 1NE England

c 1986 International Society of Antique Scale Collectors

S. Mordan & Co.

MICHAEL CRAWFORTH

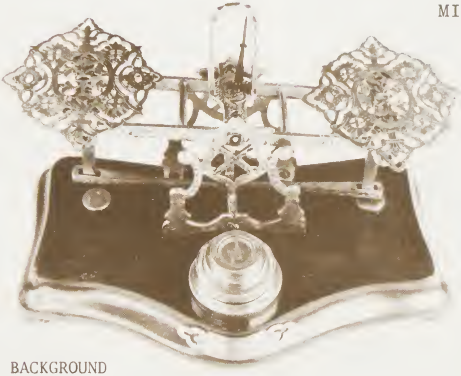


FIG 1.

HISTORICAL BACKGROUND

Most collectors of postal scales are familiar with the characterful balances made by S.Mordan & Co. The scales are remarkable for their strong construction and for their varied and attractive designs and decoration. Scale enthusiasts may not know, however, that the firm is even more famous for its other products, equally strongly made and prettily decorated.

Sampson Mordan was born in 1790 and founded his highly successful business in 1815, when he was 25 years old. His first premises were at 22 Castle Street, off City Road, London, a quiet, newly-built street near the North East corner of the Old Artillery Ground. In 1822, Mordan joined John Isaac Hawkins, a civil engineer, in patenting the 'Ever-pointed Pencil' which became an important product of his company for 120 years (3). The pencil was described in Mordan's advertisement in Pigot & Co's directory for 1827, as being made: *"Upon a principle entirely new, and which combines utility with simplicity of construction. The black lead is not enclosed in wood, as usual, but in a small silver tube to which there is attached a mechanical contrivance for propelling the lead as it is worn. The diameter of the Black Lead is so nicely proportioned as not to require ever to be cut or pointed either for fine writing, outline or shading."*

As he was using precious metals, Mordan registered his mark SM at Goldsmith's Hall in 1823. A year later, he went into partnership with Gabriel Riddle, and they entered a joint mark SMGR, at Goldsmith's Hall. The partnership was dissolved in 1836, so in 1837, Mordan re-registered his own mark (1). Following the introduction of the Penny Post, in 1840, Riddle became a competitor of Mordan's in the manufacture of letter balances. Sampson Mordan was not personally involved with scales for long, however, as he died in 1843, but the business was continued by his sons, Sampson Junior and Augustus (3).

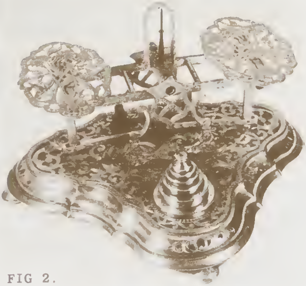


FIG 2.

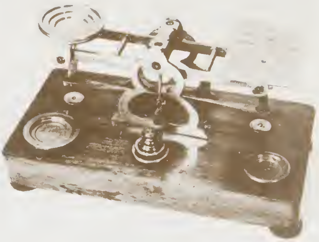


FIG 3.

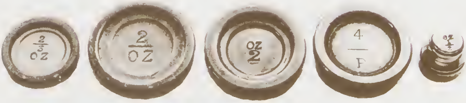


FIG 4.

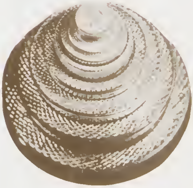


FIG 5.

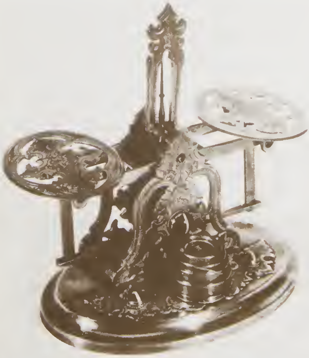


FIG 6.

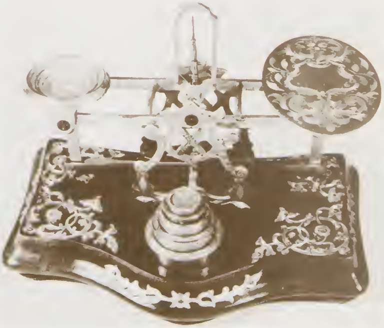
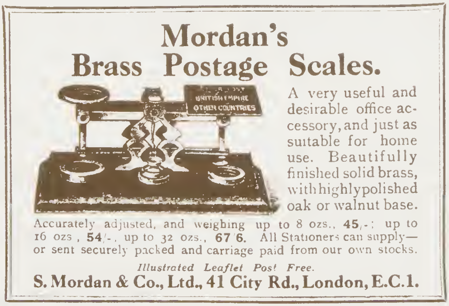


FIG 7.

It seems that Sampson Mordan Senior had an engineering training of some kind, because in his official complaint to the Lord High Chancellor about an infringement of his patent, he described himself as a "machinist" (and Riddle was described as a stationer) (3). Also, trade directories of 1840 describe his company as *"Engineers, machinists, locksmiths and manufacturers of Ever-pointed pencils, steel pens &c, &c."* However, there is no evidence in trade directories that scales and weights were among his products until the entry of 1842:

"Sampson Mordan & Co. patentees of the ever-pointed pencils, patent oblique & other steel pens; manufacturers of patent seven guard & improved detector locks, cedar drawing pencils of pure Cumberland lead; universal & self-adjusting penholders, portable quill pens; correct letter balances; patent & every decription of glass & leather ink stands, medicine chests, smelling bottles with the patent spherical stopper, toilets &c, &c; copying & seal presses & fireproof cash & deed boxes; Manufactory 22 City Rd, Finsbury Square."*

Clearly, letter scales were just one of many products, forming only a small part of Mordan's business, as they were rarely mentioned in his advertisements, although one example in the Times of 3rd April 1843, stated that Mordan made *"Correct letter balances warranted to turn to one grain"*. Another, from Punch of 17th September 1919, advertises their scales as a *"..desirable office accessory, and just as suitable for home use."* Fig 8. Although a small part of their repertoire, scales and weights must have been lucrative as they remained in production until the end.


BRITISH EMPIRE
OTHER COUNTRIES

Mordan's
Brass Postage Scales.

A very useful and desirable office accessory, and just as suitable for home use. Beautifully finished solid brass, with highly polished oak or walnut base.

Accurately adjusted, and weighing up to 8 ozs., **45**/-; up to 16 ozs., **54**/-, up to 32 ozs., **67**/**6**. All Stationers can supply—or sent securely packed and carriage paid from our own stocks.

Illustrated Leaflet Post Free.

S. Mordan & Co., Ltd., 41 City Rd., London, E.C.1.

FIG 8.

The author knows of no direct evidence that the scales and weights were actually made in the Mordan & Co. factory, but indirect evidence suggests that they were. In trade directories from 1874 to 1917 S.Mordan & Co. were listed as 'Scale & Weight Manufacturers', but these classifications often exaggerated the traders' function (they might be mere assemblers). Also, the Weights & Measures Inspectors' Handbook of 1910 included S.Mordan & Co. in its list of scale manufacturers. This may infer that the firm was involved in making scales and weights for trade use, although none have been seen by the author. It is significant that all the scales signed S.Mordan & Co. had the same sturdy quality, and the roberval letter scales had the same unique

** N.B. 'toilet' = lady's vanity case, cosmetics etc.*

method of construction. (This consistency is not found in the products marketed by companies which had scales and weights made by contractors. By changing from one supplier to another, according to the best contract price, different styles and different methods of construction were obtained). Certainly, Mordan seems to have had both the equipment and the skilled craftsmen to make scales and weights. An ex-apprentice and employee of Mordan's said that the range of pencils originated by the firm was made entirely at the City Road Works, including the smelting of metals and the drawing of tubes. Several of the original treadle lathes used by Sampson Mordan were said to be still in use in 1939 (3). Although the metalwork was almost certainly made in the Mordan works, the many specialized decorative parts, inlaid stone, Wedgwood plaques, etc, were probably bought from contractors.

FIG 9. SOME RETAILERS OF BALANCES BY S.MORDAN & CO.

Adams & Son, London.
Aldred. Yarmouth.
Asher & Sherwin, London.
Asprey, London.
Bagshaw & Sons, Liverpool.
Barnicott & Pearce, Taunton.
Briggs. London.
Brown & Co, London.
Deir & Co. London.
Field. London.
Forgie, Glasgow.
Hall & Co. Manchester.
Halstaff & Hannaford, London.
Howell & James, London.
Lovegrove & Flint, London.
Mechi... London.
Melliship & Harris, London.
Parkins & Gotto, London.
Partridge & Cooper, London.
Partridge & Cozens, London.
Phillipson & Golder, Chester.
Rodrigues, London.
Simpson & Co. London.
Smythson, London.
Trussell, Brighton.
Waller, London.
Westfield & Co.
Whitehead, Morris & Co.
Wilson & Gill. London.

On the other hand, there is abundant evidence to show that S.Mordan & Co. made postal scales for many retailers, and nearly thirty have been recorded Fig 9. There must be many more yet to be found. The evidence for retailing is that while the balances have the same style and construction - that of Mordan - the retailer's names are many, and all had businesses inappropriate to the manufacture of scales and weights. Notable examples are Asprey & Sons of New Bond St, London, silversmiths and jewellers; Hallstaff & Hannaford of Regent St. London, desk and dressing case manufacturers; Melliship & Harris of Westbourne Grove, London, stationers, jewellers and importers of fancy goods; and Parkins & Gotto of Oxford St. London, wholesale stationers. In some cases, both Mordan's name and that of the retailer were marked on the balance, but more often the retailer wanted only his name to be advertised for obvious commercial reasons.

The range of Mordan's products developed over the years and in 1889 they advertised: *"Gold and silver pencil cases, penholders, toothpicks, gold and silver-mounted glass and china scent and salt bottles, silver cigar cases, match boxes, cigar cutters, spirit lamps, flasks, copying presses, office fittings. Iron safes and jewel boxes. Watchmaker, Jeweller & Silversmith."* This list was repeated in Spanish, and the company seems to have had a significant export trade. The Post Office directory of 1905 stated that Mordan made *"Letter and Parcel post scales for all countries"*. The firm was also known for its vinaigrettes, wine labels, card cases, inkstands and thermometer holders, and their locks, marked 'Mordan & Co. Makers', appear on many surviving dressing cases and jewel boxes. Other products were sometimes marked 'S.M.& Co.' (3).

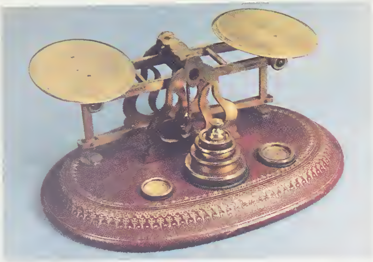


FIG 10.

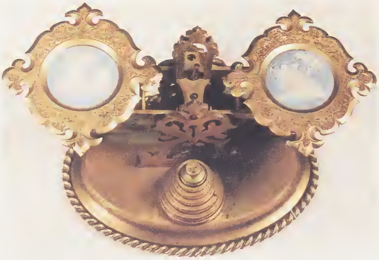


FIG 11.

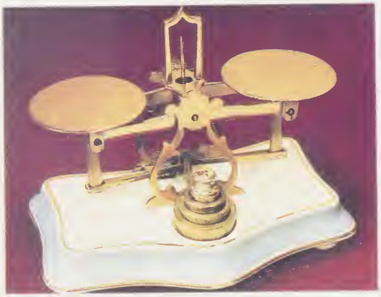


FIG 12.

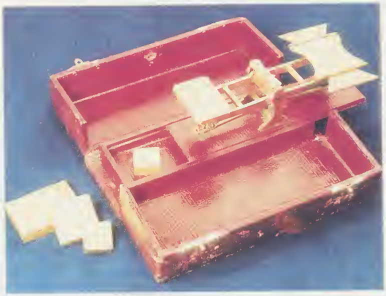


FIG 13.

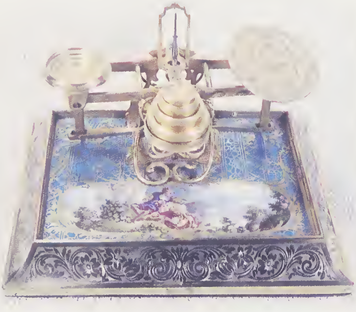


FIG 14.

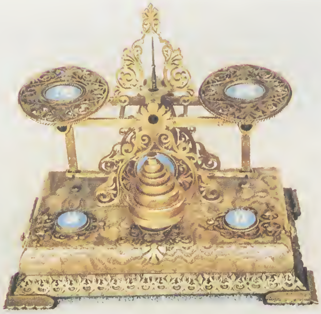


FIG 15.

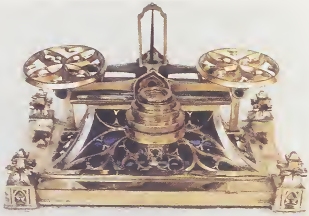


FIG 16.

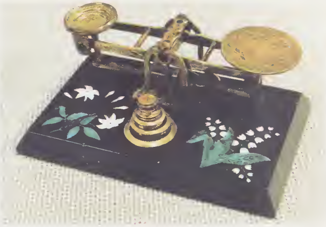


FIG 17.

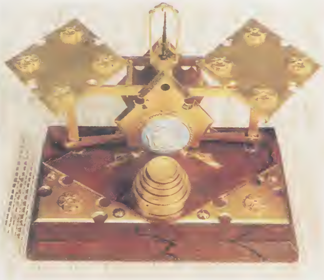


FIG 18.

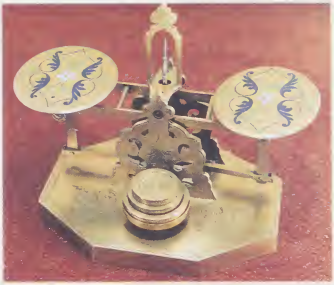


FIG 19.

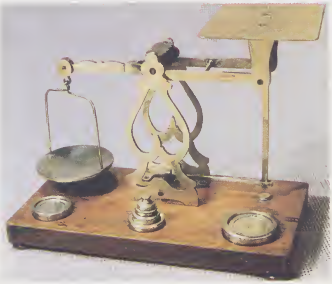


FIG 20.

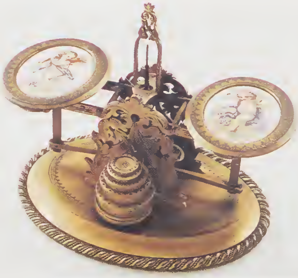


FIG 21.

As Mordan's business grew, so additional premises were acquired. In 1829, he already had a business in St.Paul's Square, Birmingham. In 1844, No.50 Cheapside was added to 22 City Road, and in 1885, the company had a shop at 28 rue St.Lazarre in Paris. In 1899, the business was listed as a limited company - S.Mordan & Co.Ltd. - but this title was not used on the company's products because their registered trade mark remained 'S.MORDAN & CO.' (3).

At the start of the second world war the company is said to have turned over to manufacture for the war effort, although trade directories of 1940 and 1941 give the usual list of products which they had made for many decades. In December 1941, the manufactory was completely destroyed by enemy bombs, and the business was never resumed.

SCALES AND WEIGHTS

By far the most common postal balances made by S.Mordan & Co. were roberval letter scales which ranged from simple sturdy balances on plain rectangular wooden bases to highly decorated balances on ornate brass filigree bases. They ranged from small scales in leather boxes only 125mm long (5") for travelling use, to large parcel scales for offices, with a base 360mm long (14") or more.

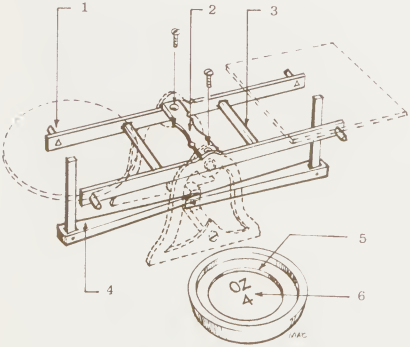
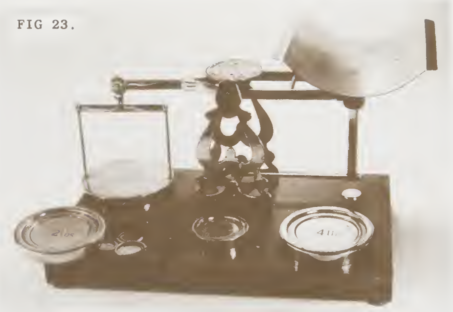


FIG 22. Characteristic features of roberval postal scales by S.Mordan & Co.

1. Individual knives at beam ends.
2. Separate bridge across the top of the A-frames, screwed in position from the top.
3. Integral spacer bars between the twin beams.
4. Triangular stays with straight legs (no loop or half-loop).
5. Weights with a stepped down centre.
6. OZ often above the number.

Some particular features of design and construction were common to almost all of Mordan's roberval balances. The twin beams with their three integral spacers, Fig 22/3, were cast in one piece. The central spacer contained the main fulcrum knives, and at the beam ends there were individual knives, Fig 22/1, allowing a simple straight leg to pass down from the plates, between the beams, to the stay. The stay itself, was tapered with the wide end pierced to take the leg, Fig 22/4. The beams were supported by A-frames connected at the top by a flat bridge attached by vertical screws, Fig 22/2. Sometimes, the bridge was pierced at the centre for an upright pointer, and had a decorative guard loop over the top, Figs 6 & 15, but the method of attachment to the A-frames was the same.

FIG 23.



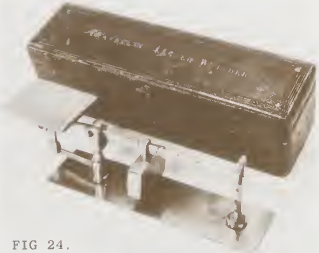


FIG 24.

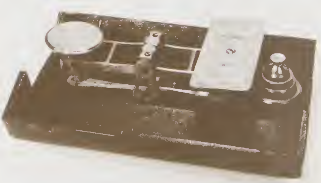


FIG 25.

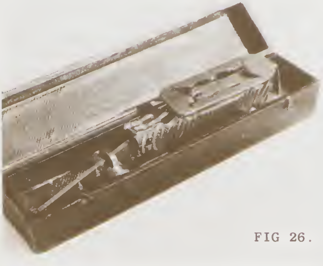


FIG 26.

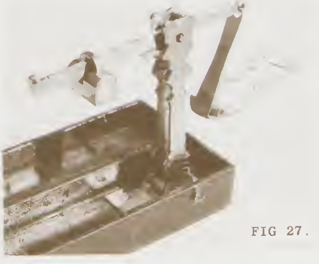


FIG 27.

Compare these features with other manufacturers' designs where the beams are made separately and joined together by rivetted spacers, and the knives extend across between the beams and commonly have a covering brass tube. Because of this design, the legs have circles or half-circles passing round the knives at the beam ends, and the legs have a forked end for the thin parallel stay. A-frames made by other manufacturers were connected at the top by a rivetted round bar, or by a bar with horizontal screws through the top of the frames. One maker, Samuel Turner, Snr. often used stays rather similar to Mordan's, but Turner's can be distinguished by the slight waisting of the sides.

Mordan's weights were distinctive, too. The centre of each weight was slightly recessed leaving a shallow step inside the main rim of the weight, Fig 22/5. The denomination was usually shown back-to-front, i.e. with OZ first, above the number. Other examples had a horizontal line between the number on top and the OZ below; or for postages, with the line between the number on top and P below, Fig 4. Only a few of Mordan's weights had the denomination expressed in the conventional way, 4 OZ. On large weights for parcel scales, the 'lb was in cursive lower case letters. If a Mordan scale has round weights without a recess, then the weights are almost certainly not original. The only exception to this seems to be the little round weights marked 'F' which commonly had no step. Unusual numerical values are also found on some Mordan weights. They fall outside the normal commercial binary sequence and were used because of their greater convenience with respect to current postage rates. The author has seen OZ 6, OZ 10, OZ 12, OZ 16 (instead of 1 lb) OZ 20, and OZ 32 (instead of 2 lb), and presumably they come from the period 1885 to 1920, when the rates went up in steps of 2 ounces.

The decorative design of Mordan's A-frames was extraordinarily varied, ranging from a simple 'bell' shape, Fig 17, to elaborately pierced and engraved floral motifs, Fig 21, or from a Wedgwood plaque on a bevelled diamond of brass, Fig 18, to interlaced palm trees. A selection of various outlines is shown in Fig 42, but there were many more.

Bases for Mordan's roberval letter scales were equally varied, from the simple elegant rectangle of polished wood, Fig 3, to the elaborately pierced and engraved brass base, Fig 2. There were oval wooden bases covered with gold-tooled maroon leather, Fig 10, black marble bases inlaid with stone flowers, Fig 17, bases with Limoges-type painted scenes, Fig 14, polished walnut bases with brass filigree spandrels, buhl bases, monumental bases, Fig 16, Tortoiseshell bases, onyx bases, bases decorated with malachite, or Wedgwood plaques, pot bases with maroon and gold linear borders, or blue and gold, Fig 12,..... the range is endless.

Weight plates and letter plates had a multiplicity of designs from elegantly plain ovals, Fig 10, or rectangles, to elaborately pierced and engraved brass scenes, Fig 2, or oval brass forms decorated with enamelled floral motifs, Fig 19. There were even plates made from highly polished wood with a decorative grain. A much-favoured type had oval or round plates with the centre removed. In the open centre was placed a Wedgwood plaque, Fig 11, a malachite panel, a Limoges-type scene, or a piece of marble inlaid with stone

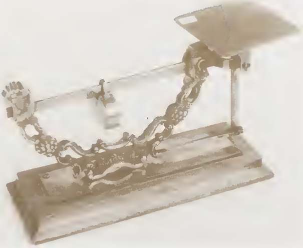


FIG 28.

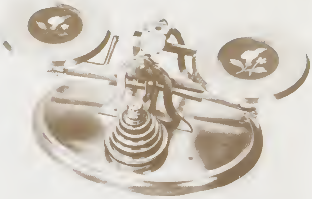


FIG 29.

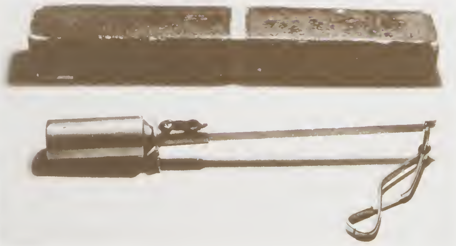


FIG 30.

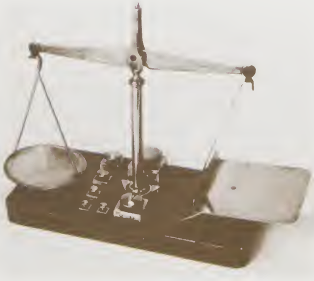


FIG 31.

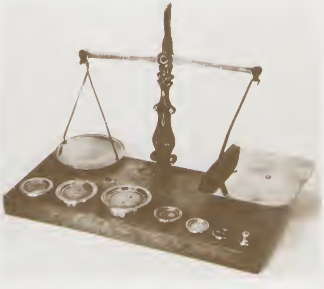


FIG 32.

flowers all arranged to look like a circular picture in a gilt frame, Figs 21 & 29. It has been suggested that these beautiful examples of stone craftsmanship were imported from Italy, but this seems unlikely when equally superb stone inlay-work was readily available from the thriving industry in Derbyshire, England.

On many of the scales, the brasswork was matt gilt, and some were nickel-plated. Both these finishes were more expensive than plain lacquered brass. Nickel-plated scales were normally mounted on black 'ebonised' wooden bases, and had matching plated weights. Plain letter plates sometimes had the current postal rates stamped on them, while the very large office postal scales had postage rates on plaques or discs mounted on the A-frame. A rare example had postage rates printed on paper and mounted in a brass letter plate shaped like a rectangular picture frame with a decorative border, Fig 34.

Mordan's weights had the characteristic recessed centre already described above, and each set was topped by a knobbed weight of the same denomination as the flat weight below, either ½ oz or ¼ oz, (the latter were marked 'F' when on top of weights marked in postages). Unfortunately, this knobbed weight is often missing from surviving sets today. If the scale was engraved, then the weights might be engraved also, Fig 21, but apparently not in all cases. Weights of 4 oz were often cased, and those over 4 oz were almost all cased (i.e. brass shells filled with lead). On large parcel scales, weights for 1 lb upwards were very flat, which made them difficult to lift out of the socket in the base.

Sockets for Mordan's weights were made in various arrangements. The most common was a single socket at the centre front of a wooden base, in which all the weights were stacked, Figs 11,17 & 18. A less common arrangement had three sockets along the front of the base with the two largest weights in the outer sockets and the remainder stacked in the centre socket, Fig 34. Some examples had the weights spread out along the front of the base, each in its own socket. During the period of special postal arrangements with France, 1869 - 1875, the special 1/3 and 2/3 ounce weights were sometimes in individual sockets, one each side of the central stack, Fig 10. On a few designs, instead of a socket recessed into the base, there was a shallow brass cup fixed to the base, or mounted by its rear edge to the front of the A-frame, Figs 14 & 16.

Many of the larger parcel scales had the extraordinary half-roberval and hanging pan design, Fig 23, which was a way of reducing friction by eliminating the stay on one side, while retaining good access to the load plate for large or awkwardly-shaped parcels. A particularly large version of this scale had four 4 lb weights and the usual lower denominations, a set of weights in tolas, and three round plaques on the front of the A-frame giving Indian inland postage rates. One example is known of a medium-sized scale of this type with strangely tall proportions, Fig 20. Mordan also made large postal scales with the roberval stays concealed in a mahogany boxed base, and with knobbed tapered 'cube' weights, or cylindrical weights, Fig 35, in competition with J.& E. Ratcliff.

Small roberval postal scales were made by S.Mordan & Co. for use by travellers. Two designs are known to the author. One had a rectangular letter plate which swivelled through 90 degrees to fit inside the black leather covered box. With the letter plate in this stored configuration, the weights were trapped in the stacked position for travelling. When the plate was turned through 90 degrees for use, the weights were accessible, Fig 25. The other design had a narrow letter plate with a trapezoidal flap hinged on each side. The flaps were opened out to hold a letter, Fig 13. This type of balance had weights stored under the base in a compartment in the bottom of the maroon leather-covered box. The lid of the compartment formed the base for the scale, and was made to slide out for use. The weights were usually plain brass rectangles, but round ones are also known. One version of the scale with flaps had a weight plate pre-weighted to ½ oz, which indicates that it was probably manufactured between 1840 and 1871.

Robervals were not the only type of postal scale made by S.Mordan & Co. They also made table-top steelyards, shelf-edge bismars, pocket spring balances and equal-arm beam scales with hanging pans.

The smallest steelyard, of the half-roberval type, was made for travellers and was contained in a leather covered box about 150mm long (6"), Fig 24. The weight was shaped like a suitcase and the beam was graduated ¼ to 2 oz. One variation of the box had six leather pockets inside the drop-down front, the pockets being marked for stamps 1d, 2d, 3d, 4d, 6d, and 1/-.

Perhaps the rarest Mordan steelyard was the folding design reminiscent of folding coin balances, Fig 26. Here, the pillars were hinged to the bottom of the box and were pulled up to erect the instrument for use, Fig 27. The beam was graduated ¼, ½, and 1 oz, and the pierced letter plate was stamped S.MORDAN & CO. The longest steelyard, unsigned but attributed to Mordan, had a base length of 430mm (17") and a capacity of 4 lbs.

The table-top steelyard shown in Fig 28, seems to have been Mordan's answer to the more commonly seen design by J.& E. Ratcliff. The beam was graduated 1 to 8 oz and postage rates stamped on the letter plate show that it was made during the period 1871 to 1897.

It is difficult to distinguish Mordan's bismar letter balance, Fig 30, from those made by Greaves & Son of Sheffield. But there are subtle differences in manufacture and clip design which suggest that it was made in Mordan's workshop, and not made by Greaves under contract. The example illustrated had two sets of graduations, ¼ to 2 oz for Britain, and ¼ to 4 tola for use in India. The weight was stamped 'S.MORDAN & CO.'

The tiny spring balance shown in Fig 36 is only 40mm long (1½"), and is stamped on the side 'S.MORDAN & CO. MAKERS'. It has a green semi-precious stone set in the end, and is graduated ½ and 1 oz. The letter clip is quite different from that used in the small spring balances by John Sheldon of Birmingham.

Equal-arm beam balances by Mordan are known with three types of base and two pillar designs. One had a simple rectangular mahogany base with either six or seven cubic knobbed weights, Fig 31. The weights were stamped on the knobs, or on the side, with either 8P down to F, or, on the seven weight set 16P to FP (i.e. 8oz - ¼oz) indicating manufacture during the rate period 1840 - 1871, Fig 40. The use of 'FP' is unusual and presumably stood for

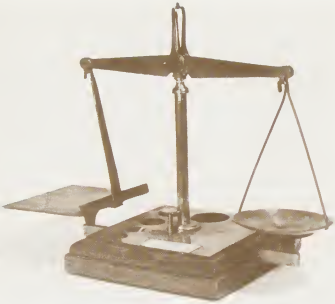


FIG 33.

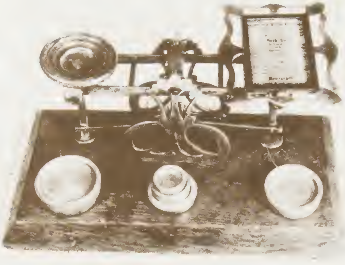


FIG 34.

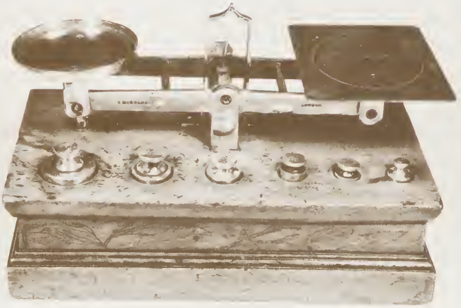


FIG 35.

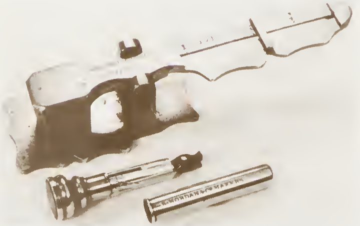


FIG 36.

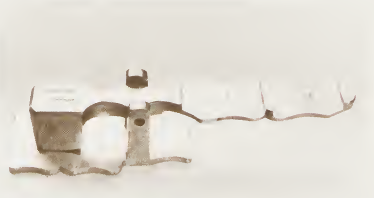


FIG 37.

Foreign Postage, instead of the usual 'F' for Foreign. The second type of base was more elaborate, having built into it an arrestment mechanism operated by a knob in front of the pillar, Fig 33. In this design, the weights were cylindrical, presumably with knobs (they were missing from the only example seen). Both these scales had plain cylindrical pillars with a guard loop over the pointer. The third type had a cast brass pillar in the shape of stylised plants, Fig 32, and was provided with flat round weights from 16P to F. The arrangement of weights was unusual in having the largest weight at the centre, and progressively smaller weights spread out on each side. All three types of balance were stamped on the beam 'S.MORDAN & CO. LONDON'.

Mordan's greatest business for balances was for postal use, but the firm also manufactured coin scales of several types, and all of them are rare. Mordan's sovereign rocker was generally similar to the common rocker design but it was much more rugged in construction and design, Fig 36. It is known in two variations, one with slot gauges, marked 'SOVEREIGN 1' and 'SOVEREIGN ½' the other of identical overall shape, had no slots and was marked simply '1' and '½', Fig 37. Both types were stamped 'S.MORDAN & CO. LONDON'.

Another, more accurate rocker design, had equal arms with stepped platters at the ends to locate the weight and the coin, Fig 39. Royal Mint weights dated 1843 were supplied, and the required weight was placed in the left platter, as indicated by the word 'WEIGHT' stamped in the wood base. Below the weight platter was a turned stop to prevent excessive tilting of the beam. The coin was placed in the right platter, as indicated by the word 'GOLD' stamped in the base. The balance was contained in a maroon leather-covered box marked on the inside 'S.MORDAN & CO. LONDON'. A variation of this design had two separate platters at each end of the beam, the outer platters for the sovereign, and the inner platters for the half-sovereign. A spring-loaded key at the centre lifted the fulcrum knife from its bearings to prevent wear and to make it easier to put the weight and coin in the platters, Fig 38. This type was also contained in a leather-covered box bearing Mordan's name.

The Company also made a multi-coin rocker, Fig 41. It had a flat sheet brass beam with slots to gauge and hold each of seven coins: Sovereign, half-sovereign, crown, half-crown, florin, shilling and sixpence. The inclusion of the florin indicates a date of manufacture after 1849. This balance was mounted in a mahogany box with a red velvet lining. The weight end of the beam was stamped 'S.MORDAN & CO.LONDON'.

Mordan also made coin weights with the words 'ONE SOVEREIGN S.MORDAN & CO.' and 'HALF SOVEREIGN S.MORDAN & CO.' around a crown. The weights were uniface and were supplied in a tiny maroon morocco box only 30 x 30 x 10mm (about 1" square) and marked 'G'WTS' (i.e. gold weights).

DATING MORDAN POSTAL SCALES

As the company did not put their address on their scales, the potentially useful changes of address cannot be used to date their products. However, balances or weights with postage rates can be dated by reference to a postage rate chart (see ISASC - A Handbook of Old Weighing Instruments - Ed.) Where

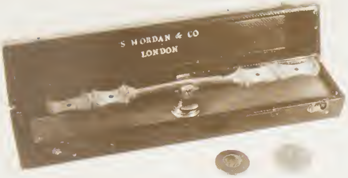


FIG 38.

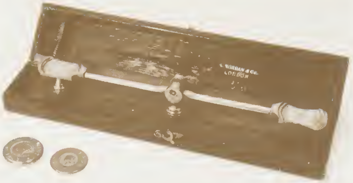


FIG 39.

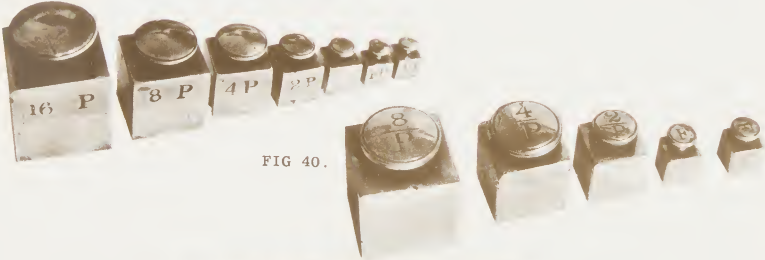


FIG 40.

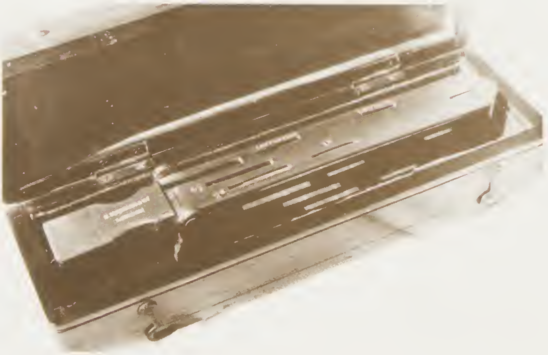


FIG 41.

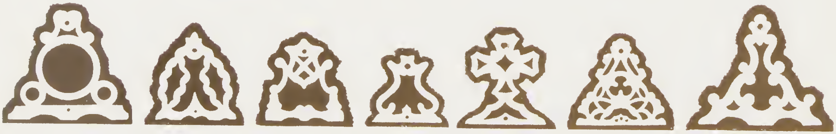


FIG 42.

postage rates are not given, some indication may be obtained from the denomination of weights or from graduations:

Weights marked 1P, 2P, 4P etc, refer to 'Postages' which were ½ oz units used from 1840 to 1871. Those marked 'F' were ¼ oz units used for foreign mail routed via France. The use of 'F' seems to have ended with Postages in 1871.

Weights or graduations of 1/3 and 2/3 oz were for letters to France and some other countries, current from 1869 until the Universal Postal Union was formed in 1875.

Although the minimum postage rate was ½ oz for inland mail, ¼ oz facilities were provided for overseas mail during the period 1840 to 1875. On the formation of the Universal Postal Union, the weight was increased to ½ oz, so scales with the smallest weight or graduation of ½ oz were probably made after 1875, but before 1906, when the weight was again increased, to 1 oz. However, the provision of ¼ oz may have continued after 1875, either from custom, or to facilitate weighing items other than letters. Sets of weights missing the knobbed top, which have the smallest weight of ½ oz cannot be dated in this way, because the missing weight(s) could be a ½ oz knobbed weight, or a ¼ oz flat and a ¼ oz knobbed weight.

Stylistic features may also give some indication of date, for example, nickel-plating and ebonised bases were popular in the period 1880 to 1910, and the flags commemorating the Crimean War depicted on the letter plates of a Mordan roberval indicate a date of c.1865 (see EQM pp.816-7). Of course, the same methods of dating apply to all British postal scales, regardless of the maker.

Several characteristics of scales made by S.Mordan & Co. placed them at the forefront of postal balance manufacture: consistently high quality and sturdy construction; attractive and often beautiful decoration; appropriate and functional design. Their purpose was not only to weigh and provide postage information, but to be a decorative asset to a home or a prestigious adjunct to the office desk. The enormous number which have survived to the present day amply demonstrates their popularity and their ability to appear worth preserving by generation after generation of owners. These admirable qualities applied to all the products of S.Mordan & Co. and their name will long be revered by enthusiasts of all kinds.

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English Coin-Weights 3

NORMAN BIGGS

THE LATE MEDIEVAL PERIOD

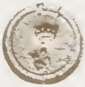
Coin-weights originated in ancient times: examples from the classical Byzantine and Islamic civilizations are illustrated by Kisch (9) and by Houben (7). These authors also describe how the introduction of gold coinage in later medieval Europe led to the need for coin-weights. More details, with special reference to the French series, are given by Dieudonné (1), but much work remains to be done on the early history of the English series.

The subject is complicated by the existence of various objects which may or may not be weights, and if they are weights, may or may not be coin-weights. A curious instance is the triangular object which Dieudonné claimed to be a weight for the franc d'or of Charles V (Plate I, 28), but which D.F.Allen (5) suggested is a weight for the English half-noble of 60 gr, issued from 1351 to 1412. When Allen wrote his article in 1937, only three examples of this object were known, and no others have emerged in nearly fifty years, so its status remains in doubt.

We are on firmer ground when we come to weights for the noble of 108 gr coined after 1412. In 1421, the gold coinage was generally in a poor state, and Parliament authorised several measures designed to rectify the situation. A statute (9 Henry V, st.2 c.7) ordained that "good and just weights of the noble, half-noble and farthing of gold" should be made and delivered to "them that will have them". Documents summarised in the Calendar of the Patent Rolls (10) show that initially, a group of Mint officials and workers was commissioned to supply the weights, and stamp them with a crown and fleur-de-lis. Later, in October 1423, John Bernes of London and Robert Curteys of York were appointed sole makers of the weights. Several weights of this type, stamped with a crown and fleur-de-lis, are known, Figs 1,2,3, and they must be regarded as the earliest authenticated coin-weights of the English series.

We do not know for how long the production of this type continued. Sir John Craig, in his history of the Mint (6), says that William Rus, Master of the Mint 1431-34, also made coin-weights for the public, and it is reasonable to suppose that these weights were of the crown and fleur-de-lis type. This conclusion is supported by the fact that there are several varieties of the weights, as may be seen from the accompanying illustrations.

In 1465, Edward IV introduced a new coinage of ryals and angels. The ryal (or rose-noble) weighed 120 gr and its obverse design closely resembled that of the old noble: a figure of a king standing with a shield in a ship, but bearing additionally, a rose on the side of the ship. I have recently been shown a weight which resembles in style the crown and fleur-de-lis type, but which bears a rose in place of the fleur-de-lis, Fig 4. This piece weighs 117 gr and it is difficult to resist the temptation to say that it is a coin-weight for the rose-noble, probably produced soon after 1465. ▷



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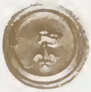

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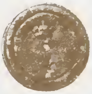

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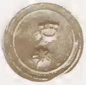

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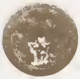

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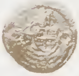

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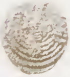

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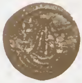

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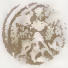

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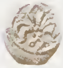

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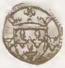


13

1. Obv. stamped crown and fleur-de-lis. Rev. blank. 96gr. 18mm. c.1421 For the noble from 1412, 108gr of fine gold, 6s 8d.
2. As No.1, with minor differences in stamps, 97gr. 19mm.
3. As No.1, with minor differences in stamps, 96gr. 19mm.
4. Obv. stamped crown and rose. Rev. blank. 117gr. 17mm. c.1465 ? Possibly for the ryal or rose-noble (1465 - 70) 120gr fine gold, 10s.
5. Obv. stamped crown and Lombardic 'H'. Rev. blank. 52gr. c.1500 ? For the half-noble (?), 54gr of fine gold, valued at 4s 6d after 1465.
6. Obv. king in ship with shield. Rev. blank. 116gr. 17mm. c.1500 ? For the ryal, as No.4.
7. As No.6, but minor differences in design. 107gr. 17mm.
8. Obv. ship with fleur-de-lis and leopard. Rev. blank. 98gr. 17mm. c.1500 ? For the noble, 108gr of fine gold, valued at 9s after 1465.
9. As No.8, but a much more basic design. 98gr. 17mm.
10. Obv. angel spearing a dragon. Rev. blank. 77.5gr. 15mm. c.1500 ?. For the angel, 80gr of fine gold, 6s 8d.
11. As No.10, but different design, 77gr. 15mm.
12. Obv. large (Florentine) lily. Rev. blank. 52gr. 14mm. c.1525 ? For the florin (of Aragon or Florence ?), valued at 3s 3d in 1522.
13. Obv. crown over French shield with three fleur-de-lis. Rev. blank. 50 gr. 13mm. c.1525 ? For the French crown (ecu), valued at 4s 4d in 1522, and at 4s 6d from 1526.

Yet another variant of these early weights has recently come to light, Fig 5. It bears the stamp of a crown over a Lombardic H, in the manner authorised by statute (11 Henry VII, c.4) of 1495. Its weight of 52½ gr, and its style suggest that it may be a weight for a half-noble. Other weights stamped with a crowned H are known, but none of them has yet been identified as a coin-weight. However, our understanding of medieval weights, in general, is still developing. Currently, many weights are being rescued from the ground by use of metal detectors, and this surprising wealth of new material gives us new opportunities to clarify the picture.

The weights described, so far, may be classified as 'symbolic' types. There are also weights from this period of the 'representational' type: that is, bearing a crude representation of the relevant coin. After the introduction of the ryals and angels in 1465, the old nobles continued to circulate, and coin-weights of the representational type for all three coins (and their halves) are known. The weights for the ryal show the king, ship and rose, Figs 6, 7, while those for the noble show only the ship, Figs 8, 9. The lack of detail on the noble weights tends to suggest that they were produced after 1465, when the noble was no longer part of the active coinage, although it is possible that they were made before 1465. The weights for the angel show the famous design of Archangel Michael slaying the dragon, Figs 10, 11; on most of them the details seem to conform more closely to the types of angel issued after 1495.

We have no definite dating for the weights of the representational type and it has become a matter of importance to find some documentary evidence for them. There are several varieties of these weights, indicating that they may have been used quite extensively for a considerable period of time. However, as we shall see, it seems unlikely that any were produced after about 1526.

In addition to the English nobles, ryals and angels, some foreign gold coins circulated in England in the late medieval period. Proclamations from the years 1522-25 (reprinted in the collected edition of Hughes and Larkin (8) give official valuations for some foreign gold: ducats at 4s 6d, French crowns at 4s 4d, and florins (of two kinds) at 3s 3d and 2s 1d.). Weights for some of these coins, which may be of English manufacture, are known. They are of the same style as the representational weights for English coins, being round and uniface, with a simple representation of the coin on the obverse. Examples are shown in Figs 12 and 13.

In 1526, it became clear that much gold was being exported to the continent because it was more highly valued there, in terms of silver. Thus, on August 22nd, 1526, the values of current coins was raised, the ryal becoming 11s, for example. On November 5th of the same year, the values were raised again, the ryal becoming 11s 3d, and all foreign gold (apart from the French crowns) was declared to be no longer current "except as the payer and receiver shall agree". (For details of these proclamations, see (8).). At the same time, a new gold coin, the crown of the double rose (57 grains of 22 ct. gold, valued at 5s) was authorized. Large numbers of these coins were minted in the period 1526-43, but it is significant that no weights for them in the round uniface style are known. For this reason alone, it seems appropriate to suggest that 1526 marks the end of the first period of coin-weight production in England. The monetary instability associated with the later years of Henry VIII is another factor supporting this conclusion, since it is hard to believe that the production of coin-weights was officially encouraged at that time.

CLASSIFICATION

One aim of this series of articles is to suggest the outline of a classification-scheme for English coin-weights. For each of the five periods described in Part 2, it is possible to distinguish one or more groups of coin-weights, each group being further subdivided for convenience into a number of subgroups. For the late medieval period, there is just one group.

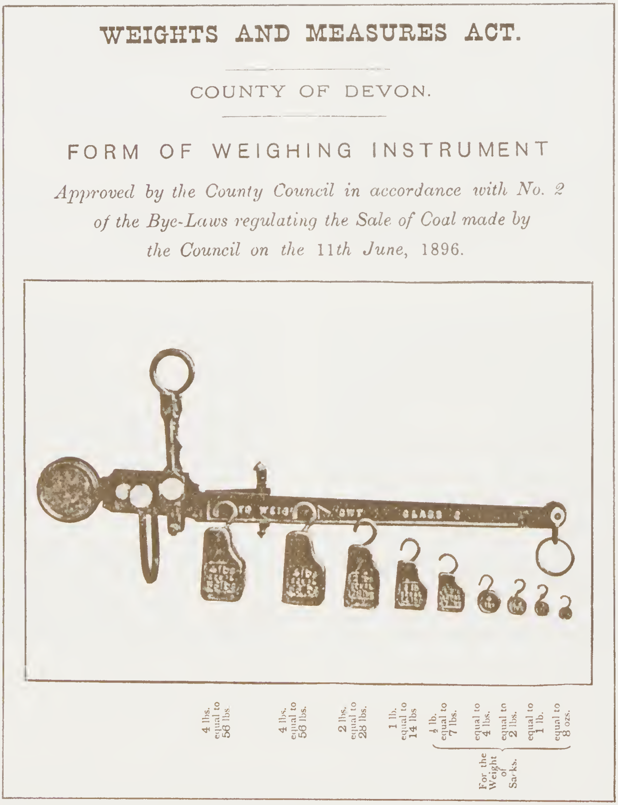
GROUP A	Uniface, round weights for nobles, ryals, angels (and possibly some foreign coins) issued 1421 - 1526.
Subgroup A1	Symbolic types; Figs 1 - 5.
Subgroup A2	Representational types, nobles; Figs 8, 9.
Subgroup A3	Representational types, ryals; Figs 6, 7.
Subgroup A4	Representational types, angels; Figs 10, 11.
Subgroup A5	Representational types, Foreign coins Figs 12, 13.

REFERENCES (References 1 - 4 are given in Part 1.)

5. ALLEN D.F.: 'A Fourteenth-Century Coin Weight' British Numismatic Journal Vol.22, pp.189-190, 1934-7.
6. CRAIG J.: 'The Mint' Cambridge University Press, Cambridge 1953.
7. HOUBEN G.M.M.: 'The Weighing of Money' Hub. Tonnauer, Roermond. 1964.
8. HUGHES P.L. & J.F.LARKIN: 'Tudor Royal Proclamations' Vol.1, Yale University Press, New Haven and London, 1964.
9. KISCH B.: 'Scales and Weights' Yale University Press, New Haven and London, 1965.
10. ANON: Calendar of the Patent Rolls, Henry V, 1416 - 1422, Henry VI 1422 - 1429, HMSO, London, 1901 and 1911.

NQ 92 LOOSE WEIGHT STEELYARD note from Bob Holdaway

The proportional weight shown in Showcase (EQM p.897 Fig 6) was used with a loose-weight steelyard for weighing coal, as shown by the enclosed illustration published by the County of Devon. Under the 1889 Act, Local Authorities were allowed to specify which types of weighing instrument were approved for weighing coal for sale in their area of jurisdiction. The small weights were to tare the weight of the sack.



WEIGHTS AND MEASURES ACT.

COUNTY OF DEVON.

FORM OF WEIGHING INSTRUMENT

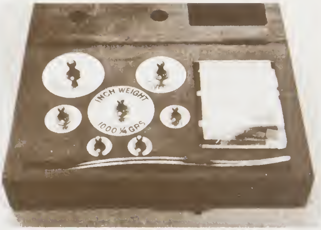
Approved by the County Council in accordance with No. 2 of the Bye-Laws regulating the Sale of Coal made by the Council on the 11th June, 1896.

4 lbs. equal to 56 lbs.
4 lbs. equal to 56 lbs.
2 lbs. equal to 28 lbs.
1 lb. equal to 14 lbs
½ lb. equal to 7 lbs.
equal to 4 lbs.
equal to 2 lbs.
equal to 1 lb.
equal to 8 ozs.
For the Weight of Sacks.

NQ 93 INCH WEIGHTS

query from Michael Crawforth

I recently saw a set of early 20th century (?) round knobbed weights in a fitted mahogany box. The central weight was marked 'UNIT' and had around its socket, a white ring marked 'INCH WEIGHT 1000 ¼ GRS'. The other weights were marked '4 UNITS 1000 GRS', 600, 300, 100, 100. There were also some flat sheet metal weights marked 40Q, 10Q, 4Q and 1Q; and presumably, Q means ¼. The tested weight of the 100 was approximately 79 grains or 5 grams. Does anyone know the purpose of these weights ?



Colour Showcase

1. Coin scales with unusual weights; possibly from Berlin ? Note that some of the weights are compounded. EMIL COHN JNR. COLLECTION
2. English traders' iron beam, length 305mm (12"). The paintwork is original. Early design but still made in the 19th C. MICHAEL CRAWFORTH COLLECTION
3. Austrian stone weights denominated in Viennese pounds. (1 Vienna 'pfund' = 0.56 kg). DR. GERHARD EISELMAYR COLLECTION
4. English brass weights, 19th C. The raised portion of the centre 1 lb weight helps stacking. MICHAEL CRAWFORTH COLLECTION
5. English postal steelyard, 19th C. gilt brass; the suspended cherub is the poise. Decorated with malachite. MICHAEL CRAWFORTH COLLECTION
6. English yarn balance, J.Casartelli & Son Ltd. Templates for cotton, wool & linen. Wire weights stored in paper. GERRY CHELLINGWORTH COLLECTION
7. American postal scale marked W.ESCHEMANN & CO. STA. A. PHILADELPHIA, PA. USA. Painted tinplate. Patents 1899, 1901. BETTY WRIGHT COLLECTION
8. American 'Zenith Egg Scale' graduated 18 - 30 oz per dozen. Painted cast iron, c.1930. BILL DONIGER COLLECTION
9. German kitchen scale by Emil Ubrig. Early 20th C. Decorated on the back with a vase and gold lion's mask. MICHAEL CRAWFORTH COLLECTION
10. English shop scale, to weigh 2 lb, by Day & Millward Ld. Birmingham. Late 19th C. The paintwork is original. MICHAEL CRAWFORTH COLLECTION

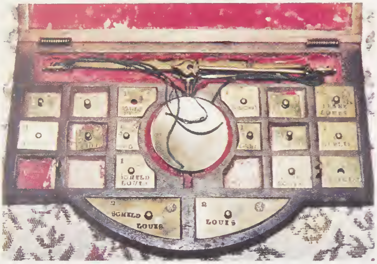


FIG 1.

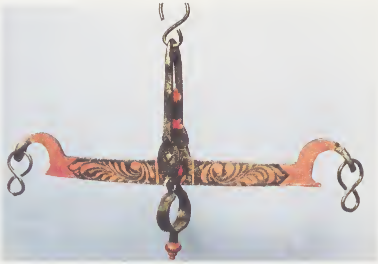


FIG 2.

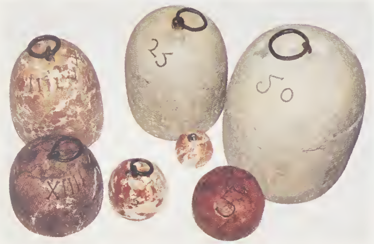


FIG 3.

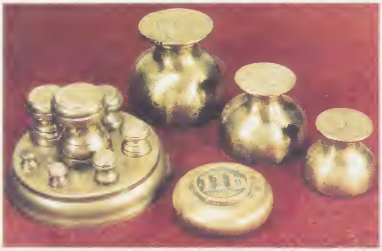


FIG 4.

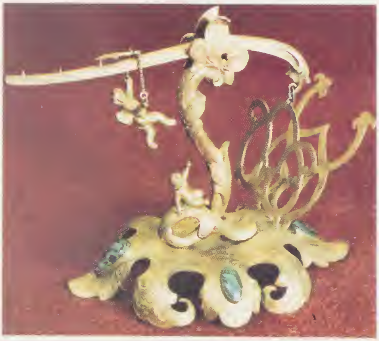


FIG 5.

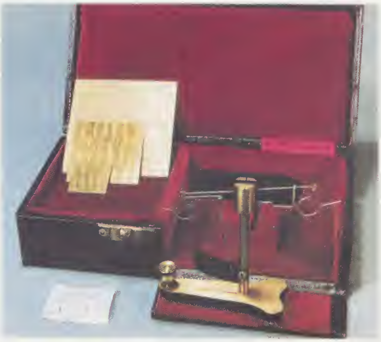


FIG 6.

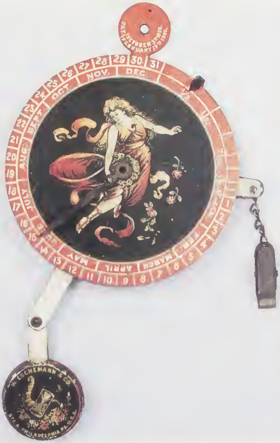


FIG 7.

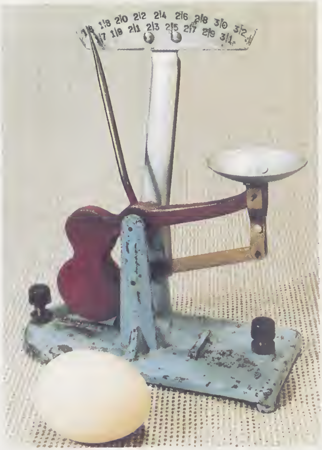


FIG 8.

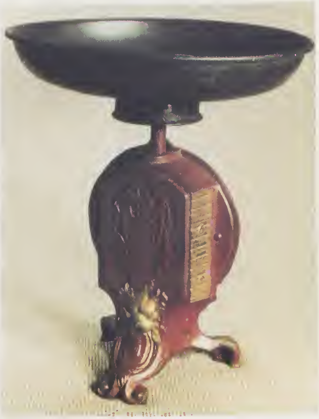


FIG 9.

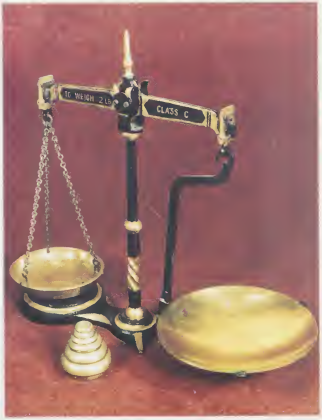


FIG 10.

Letters

TACHO-SCHNELLWAAGENFABRIK - AVERY IN GERMANY

An interesting point emerges from the articles in Equilibrium (pages 844-847 and 889-892) regarding the products and factory of Tacho-Schnellwaagenfabrik G.m.b.H.

This company was founded in Karlsruhe by W.& T.Avery Ltd. of Birmingham in 1921 for the manufacture of self and semi-self indicating scales and it is believed that it was the first Company in Germany to make this type of scale. The firm moved into premises in Duisberg in 1925 where they began to manufacture a comprehensive range of industrial as well as retail scales. The Company grew steadily in the pre-war period, although its reputation always outstripped its actual size, and after gathering up the threads in the post-war era, the Company took a new lease of life about 1960.

In 1965, Tacho was a mere David in comparison with the Goliaths of the continental scale manufacturers, but in that year the Chairman of Avery Ltd. - the holding company - remarked that 'after continued re-organisation, the results for the year were more encouraging'. However, in the financial year 1967/68, Avery Ltd. decided to dispose of Tacho to the German subsidiary of Maatschappij Van Berkel's Patent N.V. of Holland - Berkel G.m.b.H. in which Avery Ltd. have an interest.

It would appear, therefore, that if the photographs of the scales and factory are contemporary, they would have been taken before the Company moved to Duisburg in 1925.

There had always been an interchange of ideas and designs between the parent company and its subsidiary, and in fact, some components used by Tacho were made by Avery. For example, the Avery A700 indicating mechanism for industrial scales was used by Tacho. This was a double cam, double pendulum mechanism with drum and connecting ribbons.

Close observation of the photographs confirms that some of the castings used in the retail scales were of Avery origin and it may be that certain scales were just assembled by Tacho. The scale in Fig 2 is certainly Avery - it is the predecessor of the A.924 which, if my memory serves me correctly, was the A.552. The goods and weight fittings are of distinctive Avery design of the period - a skeletal brass backrail with a glass goods plate. The headwork castings are identical to those used by Avery until immediately after the war, when they were modified for economy of production.

The white scale in the centre of Fig 13 is the predecessor of the Avery A.925, which I think was the A.554. It is a 60 lb (30 kg) semi-self indicating machine with Beranger lever system. The light coloured castings to the right of Fig 10 are for the Avery A.572, and the lens fitted to the revolving dial scale in Fig 8 is identical to that used on the Avery equivalents. In fact, I had one in my possession until recently. The reason for fitting the lens was to magnify the weight divisions to the minimum allowed by the Weights and Measures Authorities for verification purposes.

Albert Rangeley.

ALLENDER'S CCDs

In response to your request in Equilibrium (page 878), I set out to gather some information about I.Wilson of New London, Conn. who made Allender's CCDs. After doing research at the Connecticut State Library, the Connecticut Historical Society, the Hartford Public Library, the New London Public Library, and the New London County Historical Society, I was able to come up with the following information:

Increase Wilson began the Wilson Manufacturing Company in New London, in 1827. He began his business by making coffee mills and wood screws. Between 1832 and 1853, the company was listed as also making hardware for whaling vessels. In 1873, they were listed as making jack screws, turning lathes, anti-friction bushings, and blocks & tackle.

I was able to find a catalogue of their products, published in 1881, and there was also a discount sheet which allowed a distributor to take 35 per cent off the price of the coin detector. Allender's patent coin scale was the only type of scale or balance in the entire catalogue (see illustration). The catalogue itself is quite extensive.

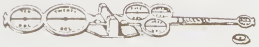
A book published in 1882 refers to the Wilson Manufacturing Company as occupying extensive works covering two full city blocks in the heart of the City, and engaged largely in the manufacture of mowing machines, brass-work, tools, and other implements. The plant was located at 6 Washington Street in New London and at one point, employed 100 workers. It was one of the first companies in New London to use steam power for manufacturing, and the building remained standing until 1940.

Increase Wilson withdrew from the business in 1855 and died in 1861. The Company was purchased by the R.T.Palmer Co. in 1888.

Gary Basch.

GOLD COIN SCALES.

ALLENDER'S



PATENT.

Adapted to all denominations of United States Gold Coin.........each, $2.00

A Reliable Scale.

APOTHECARY WEIGHTS

Regarding the recent Apothecary weight controversy, a question posed in the Apprentices Examination of 1959 in the Avery organisation was as follows:

> *What regulation covers Troy bullion weights, apothecaries weights and grain weights of (a) 1oz and over ? (b) under 1oz ?* ▷

The answer is (a) They shall be made of solid brass, gunmetal or bronze, and shall be cylindrical either with handles or knobs. (b) They shall be made of solid brass, gunmetal or bronze, platinum or aluminium, and shall be flat or wire.

All the above is in compliance with the Weights and Measures Regulations 1907, dated 27th August 1907, the particular regulation being No.55. A rider to the regulation states that Troy bullion weights below 1oz made in the form of figures appear to fulfill the requirement of the regulation as to 'flat' shape.

The simple answer as to why Geoffrey Newall has so many knobbed cylindrical weights (as I have) is that the law required that they should be this shape, and accordingly, manufacturers would have 'made hay while the sun shone'.

Apothecary weights which are plated with nickel were made illegal by the 1907 Regulations, and their rarity is brought about by the consequent destruction which would have ensued.

Albert Rangeley.

LETTERS LETTERS LETTERS *to the Editor are always welcome and will be considered for publication in these pages.*

Review

ISASC 10 YEARS

SAMPSON MORDAN & CO.

This firm's wide repertoire of products has produced enthusiastic collectors for many different Mordan artefacts. The author is fascinated by the hand-painted pictures found on their vinaigrettes and vesta boxes. So, naturally, the booklet is particularly involved with this aspect of the firm's catholic production, and with their famous ever-pointed pencils. Scales receive only a brief mention. However, the general history of the firm and family, and the development of new product ideas, is interesting as background information for all collectors of Mordan's scales and weights. The author reveals the succession of Sampson Mordan Junior and his brother, then of Edmund George Johnson, who was also an aspiring politician. Regretfully, he has not been able to discover Sampson Mordan's early training or the extent of his personal contributions to the firm's ingenious and attractive products.

SAMPSON MORDAN & CO. by Edward Eldred; published by the author, 1986. Paperback; 48 pages; 17 illustrations: Available from Mr.E.Eldred, 39 Albemarle Road, East Barnet, Herts. EN4 8EQ, England. Price: U.K. £7; Europe £8; all other countries £9; including postage. Payment in Sterling only, please.

American Patent CCDs

A SERIES ON COUNTERFEIT COIN DETECTORS

GEORGE MALLIS

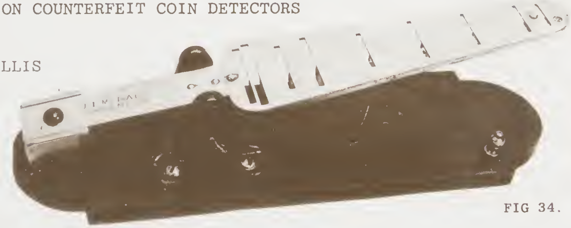
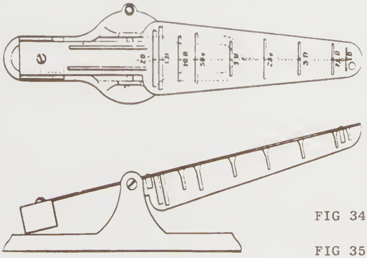


FIG 34.

Smith and Wells patented a most unusual coin tester using a spiral spring. A curved beam was pivoted at the centre of an indicator disc, and was also attached to the spring. The coin to be tested was placed in a small square vertical holder 'F' at the end of the beam. Two pointers were attached to the fulcrum pin and they indicate the weight of the coin, one pointer for gold coins, the other for silver. A circular cover concealed the spring mechanism. This is another device which does not test thickness or diameter of the coin, so it is not a CCD, in the strict sense.

Described by the patentees as presenting "an ornamental appearance to the eye", McNally and Harrison's CCD had a straight-forward rocker design. The beam had a counter weight at one end and a series of slots on a plate at the other end. The size and location of the slots was calibrated to weigh and gauge gold and silver coins. Several different bases are known. In addition to the cast metal base shown in the patent, there were a pressed sheet metal base and a plain wooden one, as illustrated in Fig 34. Instructions in the box of the balance, made for/by the Fairbanks Infallible Scale Co., state that W.H.Harrison was the manager of the Company. Advertisements for the same design of balance are known for John S.Dye of 1338 Chestnut St. (opposite the U.S.Mint) Philadelphia PA., and for the Infallible Coin Scale Co. 267 Broadway, New York City. Was the latter firm bought by Fairbanks ?



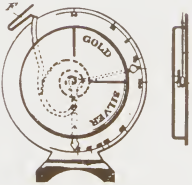


FIG 34. Patent No.259338 13 Jun 1882
G.Smith & J.J.Wells.
FIG 35. (left) Patent No.12795 28 Feb
1882 J.T.McNally & J.A.Thompson.

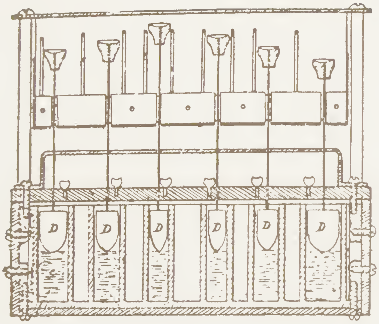
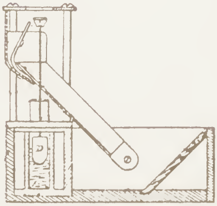


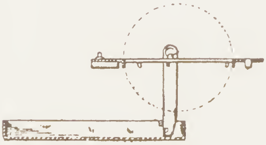
FIG 36. Patent No.264431 19 Sep 1882. J.B.Atwater. Uses floats in mercury.

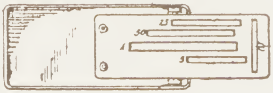


Atwater's CCD was a very complicated device that required a great deal of precision to construct, although it was relatively simple in theory. The device consisted of a flat plate with the usual slot gauges for different denominations of coins. Below each slot was a 'tray' to hold the coin as it came through its respective slot. Each tray was connected to a vertical rod which was attached to a float 'D' in a sealed cylinder containing mercury. A coin of proper weight would depress the float and allow the coin to roll down a sloping chute into a receiver-box. Counterfeits, being lighter in weight, would not depress the float and stayed in the slot.

A folding pocket coin tester for gold and silver coins was patented by M.Clark. The beam was a flat rectangular plate with suitable slot gauges for silver coins. A similar plate beam was provided to check gold coins. Each plate was fitted with a fulcrum and a counterweight. In use, the required plate was placed in bearings on the twin folding pillars, and the coin was gauged and weighed in the usual way. For carrying in the pocket, all parts fitted in the box base.

FIG 37. Patent No.273667 6 Mar 1883 M.Clark. Has two alternative beams for silver or gold.





Bachmann's complicated device combined a counterfeit coin detector and a letter scale. A box with two slot gauges in the top had, inside it, a balance beam 'B'. A counterweight 'C' at the end of the beam could be screwed along a thread for adjustment. A bar fixed across the beam at the other end projected through curved slots in the sides of the box. At each end of the bar was a coin-holder 'E', each one adjusted for a different coin. Genuine coins passed through the slot gauge, depressed the beam, and fell into an open-topped chamber at the side of the box.

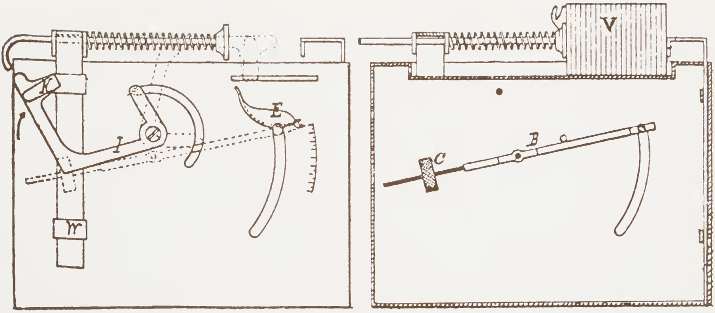
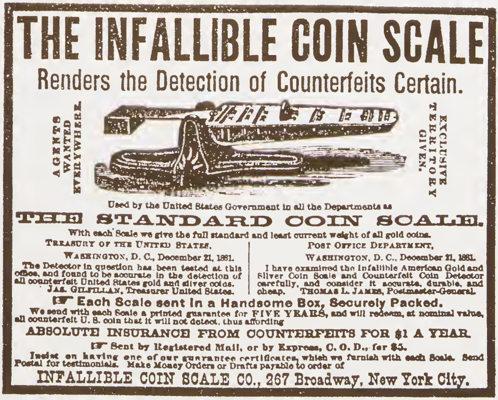


FIG 38. Patent No.285204 18 Sep 1883 E.Bachmann.
CCD, letter scale and coin store/roller.

A pivoted arm 'I' on the outside of the box had a pin projecting into the box through a curved slot. When this arm was swung manually into the working position (shown by dashed lines), the pin rested on top of the weigh beam 'B'. At the other end of the arm was a spring clip 'K'. The letter to be weighed was placed in the clip and the weight was indicated by graduations near the coin-holder 'E'.

On top of the box was a curved channel and a spring-loaded rod. Tested coins'V' were stored in this channel and could be wrapped in a paper roll for bank use. The patentee emphasised that all parts were adjustable to compensate for wear.



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JAS. GILFILLAN, Treasurer United States.

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